



Power  
System  
Operator  
Certification  
Program

2016

# CONTENTS

EXECUTIVE SUMMARY .....	3
CERTIFICATION EXAMINATION COURSE CONTENTS.....	5
PATTERN OF EXAMINATION .....	7
ELIGIBILITY FOR BASIC LEVEL CERTIFICATION EXAMINATION .....	8
REGISTRATION FEE FOR CERTIFICATION EXAM .....	9
TIMELINE FOR THE FIFTH BASIC LEVEL CERTIFICATION EXAM .....	10
ACCESS TO EXAMINATION CENTRE.....	11
EXAMINATION CENTRE REGULATIONS .....	12
WITHDRAWAL FROM THE EXAM .....	13
EXAMINATION QUESTION PAPER .....	13
AWARDING BASIC LEVEL CERTIFICATES.....	13
MAINTAINING ‘ACTIVE’ CERTIFICATION STATUS.....	14
CONFIRMATION OF CREDENTIAL TO THIRD PARTIES .....	14
DISPUTE RESOLUTION PROCESS .....	15
DISCIPLINARY ACTION .....	15
ANNEXURES	
1. SYLLABUS .....	18
2. SAMPLE QUESTION PAPER.....	20
3. REGISTRATION FORM .....	21
4. ADMIT CARD .....	22
5. TIMELINES FOR THE EXAMINATION .....	23

## EXECUTIVE SUMMARY

Operation of an interconnected power system in India is coordinated through the State, Regional and National Load Despatch Centres in collaboration with the generation and transmission control centres. Prompt action by the System Operator during minute-to-minute operation as well as a system emergency is vital for the reliability of power system. In this regard, the regulation 5.1 (h) of the Indian Electricity Grid Code mandates that the control room of the National, Regional and State Load Despatch Centre, power plants, substations of 132 kV and above, and other control centres of all regional entities shall be manned round the clock by qualified and adequately trained personnel. Further, CERC in its order dated 7<sup>th</sup> May 2008 in suo motu petition 58/2008, endorsed the need for appropriately skilled operators for secure operation of power system in India in the scenario of continuous load growth, system expansion and multiplying number of organizations.

The above subject has also been dealt with in great detail by the committee set up by the Govt. of India under the Chairmanship of Shri. G.B. Pradhan, the then Addl. Secretary, MoP. The committee recommended setting up of a system of certification of System Operators by an independent Central body. The National Power Training Institute has been entrusted with the responsibility of conducting the certification exams. Thereafter the combined committee for training and certification under the Chairmanship of Shri S. M. Dhiman, the then Member, Central Electricity Authority, suggested three levels of certification viz. 'BASIC LEVEL', 'SPECIALIST LEVEL' and 'MANAGEMENT LEVEL'. It is recommended that the certification authority may conduct the online examination for all the three levels of certification on periodic basis. This document provides the details of the **Basic Level System Operator Certification Program** as envisaged by National Power Training Institute for certification of personnel working in Load Despatch Centres in India.

As per the recommendation of the various committees/task forces constituted by the Ministry of Power/Central Electricity Authority, NPTI to start with is presently offering this program for 'BASIC LEVEL' certification of System Operators in India. The "BASIC LEVEL" certification is a mandatory requirement. NPTI has conducted FOUR national level on line examinations for "basic level" certification of Load Despatch Operators so far. Also two specialist level on line exams have been conducted in "Regulatory Fame work in Power

Sector” and one exam for “Power System Reliability” has been conducted. The certification examination for ‘MANAGEMENT LEVEL’ shall be introduced subsequently.

The registration for the Fifth certification examination for ‘BASIC LEVEL’ shall open on 7<sup>th</sup> October, 2016 and the examination shall be conducted on 11<sup>th</sup> December, 2016. Twelve examination centres have been chosen and the applicants would be allowed to take this examination at the centre of their choice. At least one centre has been located in each region to avoid long distance travel by the applicants.

All regular employees of a Load Despatch Centres in India shall be eligible to appear in this examination by filling a registration form that shall be duly endorsed by the competent authority of the organization where he/she is employed. **Further, the System Operators whose existing Basic Level Certification has expired or is due to expire within the next six months (upto March 2017) are also eligible and are encouraged to apply. The registration can be done by submission of duly filled registration form enclosed with this document.**

In order to cover the expenses for organizing this examination a nominal registration fee of Rs. 6900 (Rupees Six thousand Nine hundred only) including service tax has been kept. The fee may be paid by the organization where the applicant is employed. This fee is to be deposited by the demand draft / ECS Payment made along with the completed registration form.

The question paper will consist of multiple choice type objective questions to be answered in the stipulated time. The question paper will test the applicants on the Indian power sector, power system operation, electricity market operation, SCADA/EMS and Information Technology. All questions shall carry equal marks and there shall be no negative marking.

The applicants would be awarded grades from A to E and grade C shall be considered as the minimum criteria for awarding the certificate to the applicant. The results shall be declared by NPTI within three weeks of the date of the examination and NPTI shall communicate the results to the applicant as well as the sponsoring organization.

The System Operator certificate would have to be renewed after three years and during this period the person shall have to attend refresher course of minimum five (5) days every year as part of Continuing Professional Development (CPD).

## **CERTIFICATION EXAMINATION COURSE CONTENTS**

The system operator is required to possess the capability to clearly visualise the present state of power system, assimilate and analyse, draw conclusions and take action which are in conformity with existing Regulations, Grid code, standards and market rules. The job of system operator also involves dissemination of information and interaction with stake holders / utilities.

The Load Despatch Centres cover the four broad functional areas viz. System operation, market operation, system logistics and services. The LDCs are to function round the clock with suitably skilled manpower for system operation, market operation, research & analysis, regulatory affairs, logistics (system data acquisition, energy management, communication, IT system) and other establishment services to carry out the assigned functions. In line with the above the syllabus of the certification examination shall cover the following subjects:

### **Section-1: Power Sector Overview, Policies and Legal framework**

The legal, regulatory and the institutional framework in the country are evolving. The Operator is required to have a full and clear understanding of the legal & institutional framework he is working in. Operator must be aware of the prevailing laws of the land, the regulatory orders, institutional setups and procedures and all his actions must comply with the rules and regulations. This section would be to test the knowledge of candidates on power sector in India; Very Large Power System Operators in the world; smart grid operations and future roadmap; ring fencing of System Operation and independent functioning of load despatch centres in India; Electricity Act 2003; Legal framework, policies, regulation and organizational set up in India; Indian Electricity Grid Code; Grid Standards, Grid connectivity standards, regulations, metering standards etc.

### **Section-2: Power System Operation**

The operation of an interconnected power system requires an overall system overview as well as deep insight on the part of the Operator. The Operator is required to have an understanding of the technical aspects such as system control parameters and he must keep himself updated

on the newer technological applications. A huge amount of data is presented to the Operator in real time through which he must be able to visualize the power system, assimilate the information, analyze the situation and take suitable corrective actions. This section would test the knowledge of candidates on extra high voltage substation layouts, equipments, bus arrangements; High Voltage Direct Current transmission systems; Generation technologies- Conventional, Renewable; Frequency control-Primary, Secondary, Tertiary response, Active Power management; Voltage control-Reactive power management; Transmission line operation; power quality; Power system protection; Generator protection; classification of protective relays; Line protection and fault clearance; power system reliability, assessment of transfer capability in Indian system, ancillary services in India, Power flow simulation, fault study, stability studies etc.

### **Section-3: Power Market Operation**

Electricity Act 2003, Section 66, mandates the development of a power market. This is echoed in the National Electricity Policy (Section 5.7.1). In line with the mandate given, policy initiatives were taken by the Government of India to promote and catalyze the reform process, restructuring of the Power Sector, introduction of competition with the objective of bringing about efficiency in the Sector. A vibrant market is operating in the Country with both Bilateral and Collective (Power Exchange) segments. This section would test the knowledge of candidates on connectivity with regional and state grid, open access regulations, long term access, medium term open access; philosophy of point of connection transmission tariff and transmission losses; power exchange operation; regional energy account, pool accounts- unscheduled interchange, reactive account; unscheduled interchange and congestion charge regulations; terms and conditions of tariff regulation; metering and settlement principles; integration of renewable energy, renewable energy certificate mechanism, renewable regulatory fund etc.

### **Section-4: Power System Logistics and Information Technology**

Use of visualization tools is a must for the System Operator to assist him in the task of system operation. Effective visualization tools and techniques are a key to empowering a System Operator and facilitating quick Operator response. These tools improve the ability of the Operators to monitor the power system, detect anomalous situations and take quick corrective actions. EMS applications are available with the SCADA systems such as Network Modelling, State Estimation, Contingency Analysis (CA), load forecasting, etc. which can be used effectively to assist Operator decisions and actions. Operator decisions, actions and response times have a direct bearing on the grid operation as well as the commercial aspects. It is therefore an essential pre-requisite that the Operators manning the control rooms have good knowledge of

the SCADA/EMS systems and communication facilities provided to them for their use in the day-to-day operation. This section would test the knowledge of candidates on functions, components and architecture of SCADA systems, state estimation techniques, load forecasting and network study; VSAT, microwave, optical fibre communication system, communication system hardware, protocol, configuration, network; system software-display, database, disturbance data, collection modules, historical data recording retrieval and playback, historical information management, trends, alarms, health check, trouble shooting; information technology tools etc.

**Relevant study material shall be made accessible to all candidates desirous of taking the examination through the website [www.psti.kar.nic.in](http://www.psti.kar.nic.in) OR [www.nptibangalore.in](http://www.nptibangalore.in).**

## **PATTERN OF EXAMINATION**

The exam shall be conducted in a paperless mode. Each candidate would be provided with a separate computer terminal at the designated test centre. The candidate would appear in the exam through the interface provided on the respective computer screens. A fifteen-minute tutorial on operating instructions for the computer-based examination will be provided before the start of each examination. The tutorial would be self-explanatory, and no prior computer knowledge is needed.

The certification exam question paper shall comprise of total one hundred and fifty (150) objective-type multiple-choice questions spread over four sections. The total time allowed for answering would be two and half hours (150 minutes). There shall be equal number of questions in all the four sections and all the questions shall carry equal marks without any negative marking. Computer-based testing would allow candidates to skip questions, mark, and return to them at a later time. During the examination, candidates may change their answer to any question. A clock would be displayed on the screen at all times indicating the time remaining. The candidate has to submit his answers at the last by clicking on submit button if he completes the examination before the allotted time. No changes can be made after pressing the submit button. After expiry of allotted time, even if the candidate has not pressed submit button, the system would automatically consider the status till then as submitted. The pressing of the submit button would be considered as the completion of the examination. Before submitting, the computer will indicate any question(s) that the candidate might have marked for review or those that remain unanswered.

In the event of any accidental logging off the terminal or power supply failure, the time would stop and upon restarting would start from the point where it has stopped.

At the completion of the examination, the candidates will be invited to complete a brief questionnaire on their reactions to the examination experience and the quality of the testing centre staff and services. The time allocation for the proceedings at the exam centre would be as under:

<b>EXAMINATION STAGES</b>	<b>TIME ALLOCATION</b>
Administration and review of the candidate identification	30 minutes
Computer based tutorial	15 minutes
Examination	150 minutes
Post examination survey	15 minutes
Total	3 hours 30 minutes

The reporting time at the examination centre shall be one (1) hour before the start of the examination to complete all the activities including identification and computer based tutorial. The examination would start in the first half of the day and thus reporting shall be 0930 hrs.

## **ELIGIBILITY FOR BASIC LEVEL CERTIFICATION EXMINATION**

As per section 5.2.1 of the report of the combined committee for training and certification of system operators, all personnel working in the Load Despatch Centres (LDC) would have to undergo at least the Basic Level Certification. Each LDC executive at the entry level will have to obtain basic level certificate within 1½ years of induction. Subsequently, this certificate will have to be renewed every 3 years. Further in section 5.2.2, the report recommends that during these three years, in order to maintain the certification status as 'active', LDC executive would have to work in the respective area. Moreover, he should also have attended refresher courses for at least 5 days in a year as part of Continuing Professional Development (CPD) during this period. At the end of each financial year falling within these three years, head of the LDC will certify 'active status' of certification or otherwise for all the LDC personnel. At the end of three years, the LDC executive will have to appear in the examination for re-certification.

The eligibility criteria for appearing for the basic level certification exam for the first time would be as under:

1. The candidate shall be a resident citizen of India.
2. The candidate shall be a regular employee of any of the following- National Load Despatch Centre, Regional Load Despatch Centre, State Load Despatch Centre, Area Load Despatch Centre or Sub-Load Despatch Centre on the 1<sup>st</sup> day of the month in which the certification examination is scheduled to be conducted.



The eligibility criteria would also be applicable for a person who wants to reappear in the examination for re-certification after expiry of the validity period of an active basic / specialist level certificate.

## **REGISTRATION FEE FOR CERTIFICATION EXAM**

In order to meet the on-going expenses to develop and maintain the examinations and the management and administrative costs associated with both the examination process and credential maintenance a nominal fee shall be charged. These fees will be periodically reviewed. The applicable registration fee shall be Rupees Rs. 6900/- including service tax.

### **Payment Options**

(a) Through Demand draft/pay order payable to Director, Power Systems Training Institute, payable at Bangalore.

(b) Direct Credit through Electronic Clearing System to

Bank Name: State Bank of India

A/C Number: 10031210203

IFSC: SBIN0006767

MICR: 560002008

Account Type: Current

Name of Beneficiary: Power Systems Training Institute

Pan No:AAALN0083C

Tan No: BLRP00338C

### **Registration modes**

(a) Online registration: The procedure for online registration is given below:

- i). Access the online registration form available at the Website of PSTI.
- ii). Fill the necessary details and upload your recent photograph
- iii). Print the acknowledgement slip that is generated after successful completion of the online registration form.
- iv). Print the completed registration form and get it endorsed from the head of the respective Load Despatch Centre.
- v). Send the endorsed registration form along with the demand draft/pay order for registration fee. In case the fee has been paid through ECS, then the copy of the confirmation receipt obtained from the bank may be sent along with the registration form.

- vi). The completed registration form along with the enclosures needs to be sent to “Principal Director, Power Systems Training Institute, Banashankari II Stage, Bangalore -560070.”

**(b) Registration through manual mode**

- i). Download blank registration form from the website of PSTI ([www.psti.kar.nic.in](http://www.psti.kar.nic.in) OR [www.nptibangalore.in](http://www.nptibangalore.in)) or take a photocopy of the blank registration attached with this document.
- ii). Fill the necessary details and paste your recent photograph.
- iii). Get the completed registration form endorsed by the Head of the respective Load Despatch Centre.
- iv). Send the endorsed registration form along with the demand draft/pay order for registration fee. In case the fee has been paid through ECS, then the copy of the confirmation receipt obtained from the bank may be sent along with the registration form.
- v). Completed registration form along with the enclosures needs to be sent to “Principal Director, Power Systems Training Institute, P.O. Box No. 8201, Banashankari II Stage, Bangalore -560070”.

**TIMELINE FOR THE FIFTH BASIC LEVEL CERTIFICATION EXAM**

<b>Registration open</b>	<b>:</b>	<b>7<sup>th</sup> October, 2016</b>
<b>Last date for receipt of completed registration form at NPTI</b>	<b>:</b>	<b>21<sup>st</sup> November, 2016</b>
<b>Certification Exam</b>	<b>:</b>	<b>11<sup>th</sup> December, 2016</b>
<b>Declaration of result</b>	<b>:</b>	<b>30<sup>th</sup> December, 2016</b>

**EXAMINATION CENTRES**

The certification exam shall be conducted at following centres across the country:

- i) Guwahati (North-eastern region)
- ii) Bhubaneswar (Eastern region)
- iii) Kolkata (Eastern Region)
- iv) Chandigarh (Northern Region)
- v) New Delhi (Northern Region)

- vi) Jabalpur (Western Region)
- vii) Mumbai (Western Region)
- viii) Bangalore (Southern Region)
- ix) Lucknow (Northern Region)
- x) Baroda (Western Region)
- xi) Chennai (Southern Region)
- xii) Hyderabad (Southern Region)

The candidate shall give at least two preferences for the test centres. In case there are less than fifteen (15) candidates at a particular centre, the candidates opting for that centre shall be allotted another centre nearby. Examination centre once allotted shall not be changed. The candidates or their respective organizations may bear any expenses incurred for taking the exam at the assigned examination centre.

## **ACCESS TO EXAMINATION CENTRE**

The access to the examination centre shall be through a valid photo admit-card for the certification exam issued by the Examination Coordinator (a designated officer of NPTI). The admit card should be duly endorsed by the stamp and signature of the Examination Coordinator. In case an applicant had received the admit card but is not carrying the admit card at the examination centre designated to the applicant due to some reason then he/she would be allowed to take the exam only if he/she shows the photocopy of the exam registration form along with the valid photo identity card issued to the candidate from the respective organization. A duplicate admit card shall be issued to such candidates at the examination centre by the examination centre in-charge.

Identification(s) that have been altered or damaged will not be accepted at the test centre. If there is any discrepancy between the name on the identification presented to the test centre staff and the examination registration form, the candidate will not be admitted to test and will be marked as a 'no-show'. A report of list of no-show candidates shall be forwarded to the concerned organizations. In case of no-show, the Fee paid by the Candidate will be forfeited and he shall have to re-register by paying the Fees again for writing the Certification Exam. No refunds shall be provided in case of no-show.

The candidates are advised to reach the respective test centre at the scheduled reporting time. Candidates arriving 30 minutes after the start of the exam shall not be allowed and will be treated as no-show and shall have to re-register paying the fee again.

After completion of the exam proceedings, an acknowledgement slip shall be issued to all the candidates. The slip shall state that the candidate has appeared for the certification exam at the designated centre at the allotted date/time. The applicants are also advised to get their admit card's endorsed by the in-charge of the respective examination centre.

## **EXAMINATION CENTRE REGULATIONS**

The candidates shall comply with the following examination centre regulations:

1. Candidates who arrive late (half an hour after the beginning of the exam) shall not be allowed access. Late arrivals that are not permitted to take the examination will be considered a no-show and must reapply. No refunds shall be made.
2. No reference materials, calculators, cell phones, or recording equipment may be taken into the examination centre.
3. No test materials, documents, notes, or scratch paper of any sort may be taken from the examination.
4. Sheet for rough work shall be provided by the examination centre on request. The examinee has to write his roll number on this sheet and further the sheet is to be signed by invigilator. At the end of the exam, this rough sheet must be deposited with the invigilator.
5. Visitors are not permitted during the examination.
6. Testing centre staff is instructed to answer questions about testing procedures only. They cannot respond to inquiries regarding the examination's content.
7. During the examination, candidates may use the rest rooms for a biological break; however, the examination clock will continue running during such times.
8. Candidates may not leave the test centre until they have finished the examination.
9. Smoking is not permitted in any test centre.
10. Any candidate giving or receiving assistance, or making a disturbance, will be required to turn in their examination materials, exit the examination room, and leave the test centre. The test would be scored on as is where is basis; whether they have completed it or not. A report of such candidates shall be sent to their

respective organizations and such candidates shall be barred from appearing in the certification exam for one year.

11. Any instances of cheating, or attempts to impersonate another candidate, will be reported to the respective organization where the candidate is employed and such candidates shall be barred from appearing in the certification exam for two years.

## **WITHDRAWAL FROM THE EXAM**

A candidate may cancel and reschedule an examination appointment either by submitting a written request to the Director, Power Systems Training Institute at least five working days before the designated examination date. The candidate is allowed to re-appear in the next certification examination without paying an additional fee. If a candidate is late in withdrawing from the certification exam, does not appear for it, or arrive late, the candidate will be considered a no-show. All no-shows and candidates who have withdrawn will have to reapply to take the examination.

## **EXAMINATION QUESTION PAPER**

As recommended in the combined committee for training and certification of system operators the examination paper may be set after taking input from experts in various fields and then consolidating and moderating the same. Experts in the various fields should be selected in such a manner that they represent a good mix of the industry and academia. The questions will be of multiple choice and the candidate would be expected to mark the most appropriate choice in his/her judgement. A set of sample questions are enclosed.

## **AWARDING OF BASIC LEVEL CERTIFICATES**

In line with the recommendations of the combined committee for training and certification of System Operators, there would be total of five grades from A to E and grade C shall be the minimum benchmark for award of certification. The examination committee shall fix the criteria for award of a particular grade on the basis of performance of the candidates in the examination. Results of the certification examination shall be declared by the National Power Training Institute after grading and analysis. This may take about three weeks. The individual results shall be sent to the respective applicants as well as their sponsoring organizations. All candidates acquiring grade A or grade B or grade C shall be awarded BASIC LEVEL certificate for Power System Operation signed by Authorised Signatory / Director General, National Power Training Institute. The date on the certificate shall be considered as the reference date for the purpose of computing the validity period of the certificate.

Candidates awarded grades D and E in the examination may re-appear in the certification exams conducted subsequently. Such candidates would have to re-register for the exam by again paying registration fee applicable at the time of re-registration.

Disputes related to award of certificate, if any, shall be resolved through the dispute resolution process.

## **MAINTAINING 'ACTIVE' CERTIFICATION STATUS**

The basic level certificate will have to be renewed every three years. During these three years, in order to maintain the certification status as 'active', the Load Despatch Centre executive would have to work in the respective area. Moreover, he/she should also have attended refresher courses for at least 5 days in a year as part of Continuing Professional Development (CPD) during this period. At the end of each financial year falling within these three years, head of the Load Despatch Centre will certify 'active status' of certification or 'otherwise' for all the LDC personnel. At the end of three years, the LDC executive will have to appear in the examination for re-certification.

## **CONFIRMATION OF CREDENTIAL TO THIRD PARTIES**

National Power Training Institute shall maintain a record of all the candidates who have appeared for the certification examination in a particular year along with their grades. It shall also maintain a record of the candidates possessing 'active' certificates. National Power Training Institute (NPTI) will confirm to the sponsoring organization that an individual holds a valid/'active' system operator certificate (including releasing the certificate number and the issuance date) in response to a written request, on the employer's letterhead (or official e-mail), providing the name of the individual and the grade acquired. No further information will be provided. NPTI will forward the certificate numbers and issuance dates for individuals holding a current system operator certificate to the respective State/Central Electricity Regulatory Commissions if requested. NPTI will confirm to an employment search firm, or a potential employer, whether an individual holds a valid system operator certificate (including releasing the certificate number and the issuance date) if the search firm has a release from the individual. No further information will be provided.

## **DISPUTE RESOLUTION PROCESS**

Any dispute arising under the System Operator Certification Program, or from the establishment of rules, policies, or procedures dealing with any segment of the certification process, or as a result of disciplinary action shall be subject to the System Operator Certification Dispute Resolution Process (hereafter called the "Process"). The Process is only for the use of persons who hold a system operator certificate. The dispute resolution process consists of two steps.

1. Write to the examination coordinator (a designated officer of NPTI) explaining the nature of dispute. The candidate shall attach the photocopy of the valid admit card along with the letter. It is expected that most of the disputes shall be resolved at this first step. If the issue (s) is not resolved to the satisfaction of the parties involved in the first step, the matter may be brought to the notice of Director General, NPTI.
2. Director General, NPTI may constitute a committee to examine the dispute. The candidate shall be given an opportunity to present his/her case before the committee at a specified place, date and time. The committee shall give its recommendations to the DG, NPTI within fifteen days of the meeting with the candidate. Director General, NPTI shall communicate the final decision to the concerned person within thirty days (30) of the meeting of the aggrieved person with the committee. The decision of the Director General, NPTI shall be treated as final.

## **DISCIPLINARY ACTION**

This disciplinary action procedure is necessary to protect the integrity of the system operator credentials. Should an individual act in a manner that is inconsistent with expectations, this procedure describes the process to investigate and take action necessary to protect the credential. The following shall serve as grounds for disciplinary action:

1. Intentional misrepresentation of information provided on system operator certification exam registration form
2. Intentional misrepresentation of identification in the exam process. This includes, but is not limited to, a person identifying himself or herself as another person to obtain certification for the other person.
3. Violation of one or more examination centre regulations (as prescribed in this document) by a candidate.

4. Any form of cheating during a certification exam. This includes, but is not limited to, bringing unauthorized reference material in the form of notes, study material, or other methods of cheating into the examination centre.

The in-charge of the examination centre shall report incidents fit for disciplinary action to the certification examination coordinator. The examination coordinator may discuss with the candidate involved and submit the preliminary findings and communicate the decision to the concerned candidate. The candidate may have the right to appeal through the dispute resolution process.

-----X-----



# **ANNEXURES**

## SYLLABUS

The examination syllabus is as under

<b>Section</b>	<b>Topics</b>
<b>Section-1</b>	<b>Power Sector Overview, POLICIES AND Legal Frame Work</b>
<b>Section 1.1</b>	<b>Power Sector Overview</b>
1.1.1	Power Sector Overview in India
1.1.2	Very Large System Operators in the World
1.1.3	Smart Grid Operations- Prevailing Practices and Future Road Map
1.1.4	Ring Fencing of System Operation & Independent Functioning of Load Despatch Centers
<b>Section 1.2</b>	<b>Policies and Legal Frame Work</b>
1.2.1	Electricity Act 2003
1.2.2	Legal Frame Work, Policies & Regulation and Organisational Setup in India
1.2.3	IEGC
1.2.4	CEA Grid Connectivity Standards, Grid Standards, Regulations, Metering Standards,
<b>Section -2</b>	<b>System Operation</b>
<b>Section 2.1</b>	<b>Generation, Transmission and Frequency Control</b>
2.1.1	EHV AC Substations, Layout, Equipment, Bus Arrangements
2.1.2	HVDC Systems
2.1.3	Generation Technologies, Thermal, Hydro, Nuclear, Gas, Renewable. Power Plant Operation
2.1.4	Frequency Control- Primary Control, Secondary Control, Tertiary Control; FGMO
<b>Section 2.2</b>	<b>Protection and VAR Management</b>
2.2.1	Reactive Power Management
2.2.2	Transmission Line Charging Operational Aspects, Power Quality
2.2.3	Over View Of Power System Protection,
2.2.4	Protection Zones, Generator Protection, Classification of Protection Relays,
2.2.5	Line Protection and Fault Clearance
<b>Section 3</b>	<b>Market Operation</b>
<b>Section 3.1</b>	<b>POC Tariff and Power Exchange</b>
3.1.1	POC Tariff Philosophy, Transmission Losses
3.1.2	Power Exchange Operations
<b>Module 3.2</b>	<b>Open Access, Case Studies for State Open Access Tariff</b>
3.2.1	Open Access Regulations and Long Term and Medium Term Access and connectivity with Regional and state Perspective
3.2.2	Computation of Tariff under Open Access for a bulk customer in a state: Case Studies

<b>Module 3.3</b>	<b>Metering &amp; Settlement, REA, Terms &amp; Condition of Tariff, UI</b>
3.3.1	Regional Energy, UI and Reactive Energy Account
3.3.2	UI & Congestion Charge Regulations
3.3.3	Terms and Conditions of Tariff Regulations
3.3.4	Metering & Settlement Principles
<b>Section 3.4</b>	<b>Renewables</b>
3.4.1	Integration of Renewables, REC Mechanism, RRF
<b>Section 4</b>	<b>Power System Reliability, EMS/SCADA and IT</b>
<b>Section-4.1</b>	<b>TTC/ATC Determination, Power System Reliability, Ancillary Market</b>
4.1.1	TTC/ATC Computations and Ancillary Services in Indian Electricity Market
4.1.2	Power System Reliability
4.1.3	Power flow, Simulation, fault studies, stability studies
<b>Section-4.2</b>	<b>SCADA/EMS</b>
4.2.1	SCADA : Overview, architecture, main components, functions
4.2.2	EMS : State Estimation Techniques
4.2.3	EMS : Load forecasting and Network Study
4.2.4	Communication systems: Overview – VSAT, Microwave, Optical Fibre etc., Hardware, Protocols, Configuration, Communication network
4.2.5	System software – Displays, Database; Disturbance data collection modules / HDR retrieval & playback, HIM, Trends, Alarms, Health check, trouble shooting
<b>Section-4.3</b>	<b>IT</b>
4.3.1	Information Technology Tools

**SAMPLE QUESTION PAPER**

(Tick the most appropriate option)

1. The power system in India is demarcated into how many number of geographical regions
  - a. Three
  - b. Two
  - c. Four
  - d. Five
  
2. Assume that the power system is operating at 50.0 Hz. What would happen immediately after a generator of 500 MW trips?
  - a. Frequency increases and becomes more than 50 Hz
  - b. Frequency decreases and becomes less than 50 Hz
  - c. Frequency remains at 50 Hz
  - d. None of the above
  
3. Assume that the voltage of a 400 kV substation is 378 kV in real-time. What would be possible actions to improve the voltage at that bus
  - a. Connect more load on the LV side of the 400/220 kV ICT at that substation
  - b. Switch on the bus reactor available at that substation
  - c. Switch on the shunt capacitor bank at the nearest 132 kV substation
  - d. Open a lightly loaded transmission line
  
4. What does EMS stand for in SCADA/EMS
  - a. Employee Made System
  - b. Event Monitoring Status
  - c. Energy Management System
  - d. None of the above

**POWER SYSTEM OPERATOR BASIC LEVEL CERTIFICATION EXAMINATION - 2016****REGISTRATION FORM**

Paste your recent self attested passport size colour photograph
--

1. NAME OF THE CANDIDATE :
2. DESIGNATION :
3. FATHER'S NAME :
4. DATE OF BIRTH(dd/mm/yyyy):
5. GENDER (Male / Female) :
6. HIGHEST QUALIFICATION :

Sr. No.	Diploma / Graduate / Postgraduate	Year	Name of Institute

7. CONTACT NUMBER :
8. EMAIL ADDRESS :
9. POSTAL ADDRESS :
10. EXAMINATION CENTRE :Please select from the twelve centres listed in the brochure

Preference 1.....

Preference 2.....

**11. DETAILS OF THE REGISTRATION FEE****a) PAYMENT THROUGH DEMAND DRAFT/PAY ORDER**

- i). Demand draft/Pay order number :
- ii). Issuing bank :
- iii). Issued on date :
- iv). Amount :

**b) PAYMENT THROUGH ECS :**

- i). Issuing bank :
- ii). Transaction ID and date :

I agree to abide by the rules and regulations of the power system operator certification program.

(Signature of the candidate)

Certified that the candidate is employed in \_\_\_\_\_ Load despatch.

PLACE :

DATE :

Signature of LDC in-charge

**BASIC LEVEL CERTIFICATION EXAMINATION 2016**

**ADMIT CARD**

NAME :

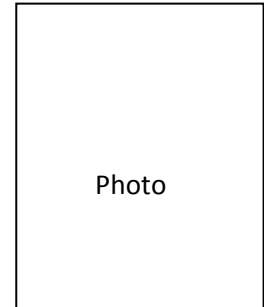
DESIGNATION :

FATHER'S NAME :

DATE OF BIRTH :

GENDER :

ADDRESS OF THE EXAMINATION CENTRE:



DATE OF EXAMINATION : 11<sup>th</sup> December, 2016

REPORTING TIME : 09.30 Hrs.

(EXAMINATION COORDINATOR)

NAME:

ADDRESS:

It is certified that the above candidate appeared in the examination for Basic level certification conducted on 11/12/2016.

(EXAMINATION CENTRE IN-CHARGE)

**TIMELINES FOR THE 5<sup>th</sup> SYSTEM OPERATOR CERTIFICATION EXAMINATION,  
2016**

<b>Sr. No.</b>	<b>Target Date</b>	<b>Activity</b>	<b>Action by</b>
1	03.10.2016	Circulation of Brochure to all System Operators by NPTI, with request for participation	NPTI
2	03.10.2016	Launch of “System Operator Certification Website” – Consolidated Electronic Portal	NPTI
3	07.10.2016	Registration for the System Operator Certification Examination Commences	NPTI
4	21.11.2016	Last date for Registration for the System Operator Certification Examination	NPTI
5	25.11.2016	Last date for withdrawal from the Certification Examination	NPTI / Registered Participants
6	30.11.2016	Completion of Processing of Registrations, despatch (by email/post) of Examination Admit Cards to the Registered participants	NPTI
7	11.12.2016	System Operator Certification Examination to be held across the Country	NPTI, Online Exam Service Provider, POSOCO, Participants
8	30.12.2016	Declaration of Results by NPTI	NPTI

\*\*\*\*\*