

**15th National Certification Examination
for Energy Managers and Energy Auditors – AUGUST 2014
(under the Energy Conservation Act, 2001)**

**23rd & 24th August 2014
Saturday & Sunday**



BUREAU OF ENERGY EFFICIENCY (BEE)
(A Statutory body under Ministry of Power,
Government of India)



National Certifying Agency
NATIONAL PRODUCTIVITY COUNCIL, INDIA
Department of Industrial Policy & Promotion,
Ministry of Commerce and Industry
Government of India



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With the enactment of the Indian Energy Conservation Act, 2001, an institutional framework has been set up in India for promoting energy efficiency in all sectors of the economy and all the energy efficiency programmes and policies in India are now being guided by the said Act.

The Energy Conservation Act, 2001 primarily ensures energy efficiency in consumption and, consequently, the Demand Side Management (DSM) for reducing the need for installing new capacity, provides the institutional framework and provisions to support the above strategy. The five major provisions of EC Act relate to:

1. Designated Consumers (mainly energy intensive industries) to comply with the specific energy consumption norms for the manufactured products and services and establishment of energy management system,
2. Standard and Labeling of energy consuming appliances, gadgets and equipment to ensure promotion of energy efficiency of the new stocks entering the market,
3. Energy Conservation Building Codes ensuring that new commercial buildings constructed in the country have less electricity consumption ,
4. Creation of Institutional Set up (Bureau of Energy Efficiency) for effective coordination of the energy conservation efforts in the country, and
5. Establishment of Energy Conservation Fund at Centre and States to provide necessary financial support for energy efficiency initiatives in the country.

The EC Act became effective from 1st March 2002 and Bureau of Energy Efficiency (BEE) was operationalized from the same date. The mission of BEE is to develop policy and strategies with a thrust on self regulation and market principles, within the overall framework of the EC Act with the primary objective of reducing energy intensity of the Indian economy.

The EC Act facilitates the State Governments to enforce efficient use of energy and its conservation. It also stipulates penalties and adjudication.

India is now in a position to move ahead at a faster pace in implementing energy efficiency programmes and policies as there is a strong institutional set up in the country equally supported by the strong commitment by the Government both at the Centre and States towards energy efficiency improvement programmes.

Within a framework of policies, focusing on optimal utilization of energy resources, energy manager profession is set to become one of the hottest professions in the near future.

In demand are energy managers and energy auditors who will not only track and save energy, but also help minimise its planet-unfriendly by-products like greenhouse gas emissions.

The revolution to engage energy managers and energy auditors has already started in Indian industry, thanks to the Indian National Certification Examination for Energy Managers and Energy Auditors.

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01. Background

The Government of India has enforced **The Energy Conservation Act, 2001** (No 52 of 2001, 29th September 2001) with effect from 1st March 2002. The Act provides mainly for efficient use of energy and its conservation and for matters connected therewith or incidental thereto. As per the Energy Conservation Act 2001, it is mandatory for all the **designated energy consumers** to get energy audit conducted by an **Accredited Energy Auditor** [under clause 14(h) and 14(i)] and to designate or appoint an **Energy Manager** [under clause 14(l)]. The Government of India has notified the list of designated consumers and the details are available at the following link: www.bee-india.nic.in

Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India, is empowered to specify the regulations and mechanism to meet the above objectives. BEE has retained the **National Productivity Council (NPC)** as the National Certifying Agency, which would conduct the National Level Certification Examination for Energy Managers & Energy Auditors under the aegis of Bureau.

02. Need for National Level Certification Examination

The essential qualification for a Certified Energy Manager and Certified Energy Auditor would be the passing of a National Level Certification Examination, which will be conducted under the aegis of Bureau of Energy Efficiency. The national level certification examination, conducted by a National Certifying Agency, will establish a uniform criterion for the certification of Energy Managers/Energy Auditors and will also ensure that services of qualified persons, having the requisite knowledge on the subject, are available to the industry.

The certification examination will be conducted based on the syllabus/curriculum approved by the Bureau. The proposed syllabus will go under modifications from time to time based on the feed back received and future developments. The requisite modifications will be incorporated by the national level certification agency in the syllabus in consultation with the Bureau from time to time.

03. Certified Energy Auditor (CEA) – Role and Importance

Certified Energy Auditor involves a systematic study undertaken on major energy consuming sections and equipments including construction of heat and mass balance with a view to identify the flow of energy, efficient use of energy in each of the steps and pin-point wastage of energy. A well-conducted energy audit would reveal the areas of wastage of energy and it would lead to suggestions for possible energy savings in all sectors.

The Energy Conservation Act requires that the every designated consumer, as notified, may get the energy audit done through an Accredited Energy Auditor in a manner and interval of time as specified. **The Certified Energy Auditor, as such, is not authorized to conduct such mandatory energy audits under the EC Act. (Certification may be one of the prerequisites along with other conditions, which have to be fulfilled by an energy auditor before applying for accreditation)** The energy audit report is to contain recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption [Clause 14(i)]. The conduct of energy audit and implementation of its recommendations on cost-benefit basis through accredited energy auditors is expected to help the designated energy consumers to achieve significant reduction in their energy consumption levels.

Responsibilities and Duties of Certified Energy Auditor (CEA) are highlighted below:

- Carry out a detailed energy audit
- Quantify energy consumption and establish base line energy information
- Construct energy and material balance
- Perform efficiency evaluation of energy & utility systems
- Compare energy norms with existing energy consumption levels
- Identify and prioritization of energy saving measures
- Analyse technical and financial feasibility of energy saving measures
- Recommend energy efficient technologies and alternate energy sources
- Report writing, presentation and follow up for implementation

04. Certified Energy Manager (CEM) – Role & Importance

Certified Energy Manager occupies an important position and is the focal point of all the activities pertaining to energy management in the organization. The certified energy manager provides leadership in the development of policy on Energy Management Action Plan and plays a key role in the formulation of corporate energy policy. Certified Energy managers also perform the activities related with Energy Management, Project Management, Personnel Management and Financial Management at the plant level. He also prepares the information to be submitted to the Designated Agency with regard to the energy consumed and action taken on the recommendation of the Accredited Energy Auditor [Clause 14(k)].

Responsibilities and Duties of Certified Energy Manager (CEM) are highlighted below:

- ❖ Establish an energy conservation cell & prepare an annual activity plan
- ❖ Develop and manage training programme for energy efficiency at operating levels
- ❖ Develop integrated system of energy efficiency and environmental improvement
- ❖ Initiate activities to improve monitoring and process control to reduce energy costs
- ❖ Co-ordinate implementation of energy audit/efficiency improvement projects through external agencies
- ❖ Establish / participate in information exchange with other energy managers of the same sector through association
- ❖ Provide information to BEE and Designated Agency of the respective States as demanded in the Act

05. Eligibility Criteria for appearing in the examination.

a) For Certified Energy Managers (CEA) Exam:

1. a graduate Engineer (Bachelor of Engineering/Bachelor of Technology) or equivalent with **three years** of work experience involving use of energy in operation, maintenance, planning, etc.; or
2. a post-graduate Engineer (Master of Engineering/Master of Technology) or equivalent with **two years** of work experience involving use of energy in operation, maintenance, planning, etc.; or
3. a graduate Engineer with post-graduate degree in Management or equivalent with **two years** of work experience involving use of energy in operation, maintenance, planning, etc.; or
4. a diploma Engineer or equivalent with **six years** of work experience(after diploma) involving use of energy in operation, maintenance, planning, etc.; or
5. a post-graduate in Physics or Electronics or Chemistry (with Physics and Mathematics at graduation level) with **three years** of work experience involving use of energy in operation, maintenance, planning, etc.

b) For Certified Energy Auditors (CEA) Exam:

1. a graduate Engineer (Bachelor of Engineering/Bachelor of Technology) or equivalent with **three years** of work experience involving use of energy in operation, maintenance, planning, etc.; or
2. a post-graduate Engineer (Master of Engineering/Master of Technology) or equivalent with **two years** of work experience involving use of energy in operation, maintenance, planning, etc.; or
3. a graduate Engineer with post-graduate degree in Management or equivalent with **two years** of work experience involving use of energy in operation, maintenance, planning, etc.

c) **Candidates should have acquired the requisite number of years of work experience as on the closing date of the application i.e. 23rd May 2014. Candidates will be registered and guidebooks will be sent only on receipt of Experience Certificate for which the last date will be 23rd May 2014. Candidates without requisite work experience are not eligible to register for the examination.**

d) Definitions

1. *“diploma engineer” means a person who has obtained a diploma in Engineering from a University or Board or Institution incorporated by an Act of the Central or State Legislature in India or other educational institutions established by an Act of Parliament or any diploma recognized by All India Council for Technical Education as equivalent or has obtained a diploma in Engineering from such foreign University or College or Institution recognized by the Central Government, and under such conditions as may be laid down for the purpose from time to time;*
2. *“equivalent” in relation to any qualification means educational qualifications acquired by passing an examination conducted by an examining body constituted by law in India or an examination recognized by the Central Government or State Governments or All India Council for Technical Education as equivalent thereto:*
3. *“graduate engineer” means a person who has obtained a graduation degree in Engineering from an University incorporated by an Act of the Central or State Legislature in India or other educational institutions established by an Act of Parliament or declared to be deemed as Universities under Section 3 of the University Grants Commission Act, 1956 or any degree recognized by All India Council for Technical Education as equivalent or has obtained a graduation degree in Engineering from such foreign University or College or Institution recognized by the Central Government and under such conditions as may be laid down for the purpose, from time to time,*
4. *“post-graduate in engineering” means a person who has obtained a post graduate degree in Engineering from an University incorporated by an Act of the Central or State Legislature in India or other educational institutions established by an Act of Parliament or declared to be deemed as Universities under Section 3 of the University Grants Commission Act, 1956 or any degree recognized by All India Council for Technical Education as equivalent or has obtained a post-graduate degree in Engineering from such foreign University or College or Institution recognized by the Central Government and under such conditions as may be laid down for the purpose, from time to time.*
5. *“post-graduate” means a post graduate of an University incorporated by an Act of the Central or State Legislature in India or other educational institutions established by an Act of Parliament or declared to be deemed as Universities under Section 3 of the University Grants Commission Act, 1956 or any degree recognized by All India Council for Technical Education as equivalent or has obtained a post-graduate degree in Engineering from such foreign University or College or Institution recognized by the Central Government and under such conditions as may be laid down for the purpose, from time to time.*

06. Examination Papers and Scheme

- a) The examination Papers for Energy Managers and Energy Auditors are given below:

Paper No	Name of the Paper	Duration	Max Marks
I	General Aspects of Energy Management & Energy Audit.	3 Hrs	150
II	Energy Efficiency in Thermal Utilities	3 Hrs	150
III	Energy Efficiency in Electrical Utilities	3 Hrs	150
IV	Energy Performance Assessment for Equipment and Utility systems (Open Book Examination)**	2 Hrs	100

- b) The candidate appearing for Energy Manager Examination has to pass **THREE papers**, viz., Paper-I, Paper-II and Paper-III and obtain a minimum of 50% of the maximum marks in each paper.
- c) The candidate appearing for Energy Auditor Examination has to pass all the above **FOUR papers** viz., Paper-I, Paper-II, Paper-III & Paper-IV and obtain a minimum of 50% of the maximum marks in each paper.
- d) **Question Papers for Energy Manager and Energy Auditor are common for the first three papers viz. Paper-I, Paper-II and Paper-III. Energy Auditor candidate passing the above three papers shall be eligible for award of Energy Manager Certification.**
- e) **The degree of difficulty in Paper-IV will be comparatively much higher than other papers.**
- f) Medium of examination is English.
- g) Paper-I, Paper-II and Paper-III shall consist of objective and descriptive type questions.
- h) The Paper-IV for Energy Auditors will be an open book examination and shall consist of descriptive and numerical questions.
**** The candidates can refer only the guide books supplied at the time of their registration, during the paper IV examination. No other reference books and written material will be allowed.**
- i) The syllabus for all the papers is given in **Annexure – I**.

j) Upgradation of EM Certification to EA Certification

Bureau of Energy Efficiency has approved the Upgradation of Energy Manager Certification to Energy Auditor Certification.

The candidates who have qualified for Energy Manager certification and who fulfill the eligibility criteria for writing the Energy Auditor Certification [**Refer item 05 (b)**] as given above are eligible for upgrading EM Certification to EA Certification.

The choice for issue of exercising this option to an eligible Certified Energy Manager is restricted within a period of 5 years from the date of issue of his/ her Energy Manager Certification.

Those eligible candidates need to appear only for Paper-4 - Energy Performance Assessment for Equipment and Utility Systems (Open Book Examination). The candidates can register online and send the printout of filled-in application along with the requisite examination fee.

07. Minimum Marks for Award of Certificates

- a) **For Certification of Energy Managers:**
50% of the maximum marks in each paper in Paper-I, Paper-II and Paper-III
- b) **For Certification of Energy Auditors:**
50% of the maximum marks in each paper in Paper-I, Paper-II, Paper-III & Paper-IV.

Note: 1. A candidate qualifying as Certified Energy Auditor automatically qualifies for Certified Energy Manager as well. Such persons can be considered for appointment or designated as Energy Manager under the EC Act, 2001 by the Designated Consumers.

2. A newly registered candidate shall be required to pass the national examination for the certification of energy managers / energy auditors by appearing in a **maximum of three attempts per paper within six consecutive examinations.**

On the basis of his results of the re-written paper(s), the candidate shall be declared to have passed the examination, provided he secures minimum of 50% marks in each of the re-written papers as applicable. In case, he does not secure minimum of 50% marks in each re-written paper(s) as stipulated above, he shall be deemed to have failed in the said National Certification Examination for which the candidate has registered.

The candidate, however, shall have the option to apply and register himself as a fresh candidate in subsequent National Certification Examinations.

However, as stated above at 6 (d), **Energy Auditor candidates passing the paper I, II and III shall be eligible for award of Energy Manager Certification.**

08. Supplementary Candidates

If a candidate, who has registered **on or before 31st May 2009** for the National Examination, fails or fails to appear in any one or more papers in his/her first National Examination, shall be eligible to re-write the same paper(s) in the **next five successive** National Examinations or **within six years** from the date of his/her first National Examination by paying prescribed supplementary examination fees.

Eligible supplementary candidates will be required to write the current and subsequent examinations under Revised Syllabus(implemented in the 11th Exam) or as applicable from time to time.

If a candidate, who has registered for 11th, 12th, 13th & 14th examination, has to pass by appearing in a **maximum of three attempts per paper within six consecutive examinations.**

On the basis of his/her results of the re-written paper(s), the candidate shall be declared to have passed the examination, provided he secures minimum of 50% marks in each of the re-written papers as applicable. In case, he does not secure minimum of 50% marks in each re-written paper(s) as stipulated above, he shall be deemed to have failed in the said National Certification Examination for which the candidate has registered.

The candidate, however, shall have the option to apply and register himself as a fresh candidate in subsequent National Certification Examinations.

However, as stated above at 6 (d), **Energy Auditor candidates passing the paper I, II and III shall be eligible for award of Energy Manager Certification.**

09. Validity of the Certificate

The certificate shall be valid for life time until it is cancelled, subject to the condition of attending of an authorized refresher training course of short term duration by the candidate in a designated /approved institute or organization (to be announced by the Bureau) once in a 5 year time period, commencing from the date of award of certificate. A six- month's grace period will also be provided to the certified energy managers and energy auditors after the expiry of 5-year period. The Candidate will be required to inform the BEE about the attendance of the refresher course on a specified format so that a fresh certificate is issued to the candidate for another 5-year period.

10. Revocation of Certificate

The Certificate can be revoked on the ground of proved instances of unprofessional/unethical practices followed by a Certified Energy Manager and Certified Energy Auditor. The Bureau shall constitute a Committee for this purpose, which will investigate the matter. The concerned Certified Energy Manager and Energy Auditor will be informed of the charges against him/her and given a reasonable opportunity of being heard in respect of such charges.

11. Examination Centres

a) The proposed centres for conduct of the written examination are: –

Ahmedabad, Bengaluru, Bhopal, Bhubaneswar, Chandigarh, Chennai, Cochin, Dehradun, Delhi/NCR, Goa, Guwahati, Hyderabad, Jabalpur, Jaipur, Kanpur, Kolkata, Mumbai, Nagpur, Patna, Pune, Raipur, Ranchi, Thiruvananthapuram and Vadodara.

c) The applicant will have to give three choices of examination centres in the order of preference.

d) If the number of applicants for a particular centre is found to be less than the minimum required number, the examination centre for those applicants can be shifted to next preferred centres.

12. Examination Schedule

Paper No	Examination Paper	Examination Date	Time
I	General Aspects of Energy Management & Energy Audit.	23 Aug 2014	0930-1230 Hrs
II	Energy Efficiency in Thermal Utilities	23 Aug 2014	1400 -1700 Hrs
III	Energy Efficiency in Electrical Utilities	24 Aug 2014	0930-1230 Hrs
IV	Energy Performance Assessment for Equipment and Utility systems (Open Book Examination)	24 Aug 2014	1400 -1600 Hrs

13. Fee

FOR NEW CANDIDATES

(a) Application Fee:

- | | | |
|-------|---|-----------|
| (i) | for general candidates | Rs. 500/- |
| (ii) | for candidates belonging to the Scheduled Castes or the Scheduled Tribes | Rs. 250/- |
| (iii) | for candidates belonging to Other Backward Classes having annual income of less than Rs.4.5 lakhs per annum | Rs. 250/- |

(b) Certification fee including Examination fee:

- | | | |
|-------|---|--------------|
| (i) | for general candidates | Rs. 10,000/- |
| (ii) | for candidates belonging to the Scheduled Castes or the Scheduled Tribes | Rs. 5,000/- |
| (iii) | for candidates belonging to Other Backward Classes having annual income of less than Rs.4.5 lakhs per annum | Rs. 5,000/- |
| (iv) | for company sponsored candidates | Rs. 20,000/- |

FOR SUPPLEMENTARY CANDIDATES

Application Fee: Nil

Examination Fee:

- | | | |
|-------|---|----------------------|
| (i) | for general candidates | Rs. 1500/- per paper |
| (ii) | for candidates belonging to the Scheduled Castes or the Scheduled Tribes | Rs. 750/- per paper |
| (iii) | for candidates belonging to Other Backward Classes having annual income of less than Rs.4.5 lakhs per annum | Rs. 750/- per paper |

FOR UP GRADATION FROM ENERGY MANAGER TO ENERGY AUDITOR

Up gradation Fee:

- | | | |
|-------|---|------------|
| (i) | for general candidates | Rs. 1500/- |
| (ii) | for candidates belonging to the Scheduled Castes or the Scheduled Tribes | Rs. 750/- |
| (iii) | for candidates belonging to Other Backward Classes having annual income of less than Rs.4.5 lakhs per annum | Rs. 750/- |

Note: Those Candidates claiming fee concession have to submit copies of necessary supporting documents.

- ◆ Prospectus can be downloaded and the candidate **has to apply online** accessing the websites www.aipnpc.org or www.em-ea.org or www.bee-india.nic.in and take the printout of the filled in application form and send it along with requisite fee and all enclosures.
- ◆ **Application Fee and Certification Fee (Rs.10,500 (or) Rs. 20,500 (or) Rs. 5,250 as applicable)** is to be paid by one common Demand Draft drawn in favour of “Bureau of Energy Efficiency” payable at “Chennai” along with Application Form for Registration.

14. Guide Books

The following Guide Books have been revised from 11th Examination and are specially developed for the candidates appearing for the examination:

- Paper-I: General Aspects of Energy Management & Energy Audit
- Paper-II: Energy Efficiency in Thermal Utilities
- Paper-III: Energy Efficiency in Electrical Utilities
- Paper-IV: Energy Performance Assessment for Equipment and Utility Systems.

The Guide Books for supplementary candidates of previous examinations (i.e those who have registered for November 2008 exam to May 2009 exam) and who have not registered for 11th, 12th, 13th & 14th examinations for the paper(s) not qualified of previous examination, will be supplied on complimentary basis for the specific paper(s) in which he/she registers, as a one time measure for the 15th examination (as the syllabus has been revised).

Those who have registered before November 2008 examination are not eligible for writing the supplementary examination as per the eligibility criteria.

15. Registration and Certification Process

- Registration for the certification Examination will be done on receipt of the filled-in application form along with requisite fees from the candidates.
- **The candidates have to send the printout of the filled in online application form along with all necessary enclosures and fee by DD. Once we receive the physical form, the same will be scrutinized within ten working days and if found eligible, a Registration No. will be allotted and the Registration No. will be informed through email.**
- Guide Books will be despatched by speed post/Regd.Parcel to all the registered candidates.
- **Printout of the Hall Tickets can be taken online at www.aipnpc.org two weeks before the commencement of the examination.**
- The results of the written examination will be communicated to all the candidates by post and also displayed online at www.aipnpc.org
- Certificates and credentials will be awarded to the successfully passed eligible candidates.

16. Role of NPC as the National Certifying Agency

The Bureau of Energy Efficiency has retained the National Productivity Council (NPC) as the National Certifying Agency, which would conduct the National Level Certification Examination for Energy Managers & Energy Auditors.

NPC will carry out the following activities as a National Certifying Agency:

- 1) Dr. Ambedkar Institute of Productivity (AIP), National Productivity Council, Chennai will receive and process the applications from the candidates and register them as per the laid down procedures.
- 2) NPC will send all necessary instructions in respect of the Certifying Examination and other details such as the venue of examination, timings, code of conduct for the candidates who are registered for the examination for Energy Managers and Energy Auditors.
- 3) NPC will administer the examination in all the centres.
- 4) NPC would issue the Certificates and Credentials under the seal of Bureau of Energy Efficiency, a statutory body under Ministry of Power, Government of India to the successfully passed eligible candidates.

17. Conditions and instructions to the Candidates

01. Read the prospectus completely.
02. All entries should be correctly filled.
03. Attach proof of work experience certificate as per the eligibility criteria.
04. Attach a Photostat copy of Degree/Diploma certificate as per the eligibility criteria duly attested by Gazetted Officer.
05. Affix recent passport size photograph in application form. (Need not be attested)
06. Enclose Demand Draft towards the fees in favor of **Bureau of Energy Efficiency** payable at **Chennai**.
07. Self-sponsored candidates (individual in the category of SC/ST/OBC will be required to submit the attested copies (by gazetted officer) of the necessary supporting documents as mentioned in the prospectus and as per the **formats applicable for Govt. of India Postings**. (Format can be downloaded from the website: www.aipnpc.org). Other formats issued in local languages will not be accepted.

08. **Filled-in application form along with requisite fee should reach the following address on or before 23rd May 2014:**

**The Director
National Productivity Council
Dr. Ambedkar Institute of Productivity
6, Aavin Dairy Road, Ambattur Industrial Estate (North)
Ambattur, Chennai – 600 098
Tel. No. 044 – 26255216 Tele Fax No. 044 26255012
Fax No. 044 – 26254904
Email: ainnpc@vsnl.net**

Note: All correspondence related with Certification Examination should be made to the above address only.

09. Use the Guide books for the Preparation of examination.
10. It is not compulsory to undertake any preparatory training program before appearing in the National Certification Examination. Further, BEE has neither authorized any agency to conduct such preparatory training programs nor provides any guarantee on the quality of their training materials.
11. **The fees paid by a candidate who has been admitted to the National Examination, shall not be refunded or adjusted under any circumstances on the basis of medical or any other ground.**
12. The candidates will have the responsibility to cross check the information on allotted examination centres, issue of hall tickets and other instructions issued from time to time, from the below mentioned websites.
13. Any candidate, who does not receive or loses the admission ticket, shall report to the allotted examination centre with documentary evidence of having registered for National Examination. Information about allotted examination centres may be seen at the web-site(s) mentioned in the prospectus.
14. (a) If a candidate on declaration of the results of National Examination is not satisfied with the marks given in any paper(s) and feels that there is possibility of either omission in marking of any answer(s) or there is possibility of mistake in totaling of the marks in any paper(s), the candidate may seek verification of all or any paper on his submitting an application accompanied by a fee of Rs 200 for each paper, to be paid by DD drawn in favour of “**Bureau of Energy Efficiency**” payable at “**Chennai**”, to National Productivity Council, Chennai **within a month of the declaration of the results** of the said National Examination. The Bureau or the Agency shall entertain no request for such verification after the expiry of the said period of one month.
- (b) A candidate shall be eligible to seek verification of paper(s) of the said National Examination for one time only.
- (c) The process of verification shall be completed within a period of one month from the date of receipt of the application by the NPC
- (d) The marks obtained by a candidate in individual questions of paper(s) shall not be supplied.
- (e) Request for revaluation of evaluated Answer Books will not be entertained.
- (f) **Photocopies of evaluated Answer Books will not be made available to candidates.**

15. BEE reserves the right to change the examination dates due to some unforeseen reasons and reasons beyond its control.
16. It is compulsory for the registered candidates to give E-mail ID, as most of the communication regarding the examination will be sent by E-mails.
17. For Examination updates visit websites www.aipnpc.org, www.bee-india.nic.in, www.em-ea.org

INSTRUCTIONS FOR CANDIDATES TO APPLY ONLINE

GENERAL INFORMATION:

1. Candidates are advised to go through the prospectus before filling the online application form.
2. You should have an email id (If you don't have an email account, please create one in free sites)
3. **FEE:**
 - i) **The candidates should keep ready and submit the details of Fee payment, Educational Qualification, Experience, while filling in the ONLINE APPLICATION.**
 - ii) **Application fee and Certification fee should be paid by one common Demand Draft. The application fee and the Certification fee is non-refundable once the registration is accepted.**

How to Apply

- Fill online application form at www.aipnpc.org, please fill the form with all details and click "Submit" button for registration. You can have a **preview** of the application form and application number would generate. If any changes are to be done you can go back and make necessary changes. If all the details are correct, click "**confirm**" button. (After confirmation no changes can be done. However, in case the candidate fill the application wrongly, he/she can fill the online application afresh and submit again. The application form received with enclosures and fee will alone be accepted and registered.
- **Take a print out of the generated online application form after successful submission of data.**
- Affix one passport size photo in the application.
- Candidate must enclose copies of all relevant certificates in proof of Qualification, Experience and Caste (if applicable), etc. Otherwise the application will be rejected. (For supplementary candidates need not send proof of qualification, experience).
- The format of OBC Certificate/SC/ST Certificate in Govt. of India format can be downloaded from the website: www.aipnpc.org
- The Employment Experience Certificate format can be downloaded from the website: www.aipnpc.org

Send the printed application form through post or courier, with enclosures to reach the following address on or before **23rd May 2014**:

The Director
National Productivity Council
Dr.Ambedkar Institute of Productivity
6, Aavin Dairy Road,
Ambattur Industrial Estate (North)
Ambattur, **Chennai – 600 098**

- **Applications received after the last date OR in any other format other than the prescribed one OR incomplete will be summarily rejected. Delays in transit and applications without relevant enclosures would be rejected without assigning any reason.**
- **In all subsequent correspondence make sure that invariably you quote the registration number, which you will intimated through email once registered the application.**

- **Candidates sponsored by State Development Agencies (SDAs) will also have to register through on-line application. In the case of SDA sponsored candidates, wherever mandatory, fill in '0' in the space provided for DD No., Amount (Rs.), Bank Name, etc. While filling the online application and sending the printed application for registration, a copy of the letter from the Sponsoring Authority Agency (SDA) is to be enclosed along with the application.**

For any clarification contact us at aipnpc@vsnl.net

List of Enclosures to be attached with the Application.

- 1 Proof for requisite educational qualification. (Certificate(s) should be attested by a Gazetted Officer / Employer).
- 2 Proof for requisite experience certificate(s). The Experience Certificate format can be downloaded from the website (excepting the Supplementary Candidates and candidates applying for up gradation of EM certificate to EA certificate, who have already submitted the Experience Certificates)
- 3 One common DD for Application fee and Certification fee in favor of **Bureau of Energy Efficiency payable at Chennai**. (For supplementary candidates and candidates applying for up gradation of EM certificate to EA certificate there is no application fee)
- 4 The self-employed candidates should attach proof for at least two major works carried out for the clients. (Attach either work order or letter from the clients). In addition the candidates should attach photocopies of the Income tax returns for a minimum period of two years.
- 5 Affix one recent passport size photograph in application form.
- 6 Proof of SC/ST/OBC certificates as per Govt. of India format in case of claiming fee concession. **Certificates issued in local languages will not be accepted**. Format can be downloaded from the website:www.aipnpc.org
- 7 Proof of Income certificate (from the employer) for self sponsored candidates in the category of OBC having annual income of less than Rs. 4.5 Lakhs per annum.

Syllabus for Energy Managers and Energy Auditors Certification Examination

PAPER-1: GENERAL ASPECTS OF ENERGY MANAGEMENT AND ENERGY AUDIT

- 1.1 **Energy Scenario:** Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, Indian energy scenario, Sectoral energy consumption (domestic, industrial and other sectors), energy needs of growing economy, energy intensity, long term energy scenario, energy pricing, energy security, energy conservation and its importance, energy strategy for the future.
- 1.2 **Energy Conservation Act 2001 and related policies:** Energy conservation Act 2001 and its features, notifications under the Act, Schemes of Bureau of Energy Efficiency (BEE) including Designated consumers, State Designated Agencies, Electricity Act 2003, Integrated energy policy, National action plan on climate change.
- 1.3 **Basics of Energy and its various forms:** Electricity basics – Direct Current and Alternative Currents, electricity tariff, Thermal Basics-fuels, thermal energy contents of fuel, temperature and pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity and heat transfer, units and conversion, Metric Ton Oil Equivalent conversions.
- 1.4 **Energy Management & Audit:** Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel and energy substitution, energy audit instruments and metering, precautions, thermography, smart metering.
- 1.5 **Material and Energy balance:** Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.
- 1.6 **Energy Action Planning:** Key elements, force field analysis, Energy policy purpose, perspective, contents, formulation, ratification, Organizing - location of energy management, top management support, managerial function, roles and responsibilities of energy manager, accountability. Human resource development techniques, Information system-designing barriers, strategies; Marketing and communicating-training and planning.
- 1.7 **Financial Management:** Investment-need, appraisal and criteria, financial analysis techniques-simple pay back period, return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis; financing options, energy performance contracts and role of Energy Service Companies (ESCOs).
- 1.8 **Project Management:** Definition and scope of project, technical design, financing, contracting, implementation and performance monitoring. Implementation plan for top management, Planning Budget, Procurement Procedures, Construction, Measurement & Verification.
- 1.9 **Energy Monitoring and Targeting:** Defining monitoring & targeting, elements of monitoring & targeting, data and information-analysis, techniques - energy consumption, production, cumulative sum of differences (CUSUM). Energy Management Information Systems (EMIS)
- 1.10 **Energy, Environment and Climate change:** Energy and environment, air pollution, climate change United Nations Framework Convention on Climate Change (UNFCCC), sustainable development, Kyoto Protocol, Conference of Parties (COP), Clean Development Mechanism (CDM), CDM Procedures case of CDM – Bachat Lamp Yojna and industry; Prototype Carbon Fund (PCF).

- 1.11 **New & Renewable Energy Sources (NRES)** : Concept of renewable energy, Solar energy, wind energy, biomass boilers and gasifiers, biogas, biofuels, hydro, fuel cells, energy from wastes, biomethanation, wave, tidal, geothermal.

PAPER 2: ENERGY EFFICIENCY IN THERMAL UTILITIES

- 2.1 **Fuels and Combustion:** Introduction to fuels, properties of fuel oil, coal and gas, storage, handling and preparation of fuels, principles of combustion, combustion of oil, coal and gas. Agro-residue/biomass handling, preparation and combustion.
- 2.2 **Boilers:** Types, combustion in boilers, performances evaluation, analysis of losses, feed water treatment, blow down, energy conservation opportunities. Boiler efficiency calculation, evaporation ratio and efficiency for coal, oil and gas. Soot blowing and soot deposit reduction, reasons for boiler tube failures, start up, shut down and preservation, Thermic fluid heaters, super critical boilers.
- 2.3 **Steam System:** Properties of steam, assessment of steam distribution losses, steam leakages, steam trapping, condensate and flash steam recovery system, identifying opportunities for energy savings. Steam utilization, Performance assessment more details, installation, thermo-compressor, steam pipe insulation, condensate pumping, steam dryers
- 2.4 **Furnaces:** Classification, general fuel economy measures in furnaces, excess air, heat distribution, temperature control, draft control, waste heat recovery. Forging furnace heat balance, Cupola, non ferrous melting, Induction furnace, performance evaluation of a furnace, hot air generators.
- 2.5 **Insulation and Refractories:** Insulation-types and application, economic thickness of insulation, heat savings and application criteria, Refractory-types, selection and application of refractories, heat loss. Cold insulation.
- 2.6 **Fluidized Bed Combustion FBC boilers:** Introduction, mechanism of fluidized bed combustion, advantages, types of FBC boilers, operational features, retrofitting FBC system to conventional boilers, saving potential. Biomass based fluidized bed combustion boilers - application and operation, Atmosphere Fluidized bed combustion boilers, Circulating Fluidized bed combustion boilers, Pressurized Fluidized bed combustion boilers.
- 2.7 **Cogeneration:** Definition, need, application, advantages, classification, saving potentials. heat balance, steam turbine efficiency, tri-generation, micro turbine.
- 2.8 **Waste Heat Recovery:** Classification, advantages and applications, commercially viable waste heat recovery devices, saving potential.
- 2.9 **Heat Exchangers** : Types, networking, pinch analysis, multiple effect evaporators, condensers, distillation column, etc.

PAPER 3: ENERGY EFFICIENCY IN ELECTRICAL UTILITIES

- 3.1 **Electrical system:** Electricity billing, electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses. Star labeled distribution transformers, Demand side management, Assessment of transmission and distribution efficiency, losses due to harmonics and voltage unbalance, Maximum demand controllers, automatic power factor controllers, energy efficient transformers.

- 3.2 **Electric motors:** Types, losses in induction motors, motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors. Star labeled energy efficient motors, squirrel cage and slip ring and their characteristics, motor history sheet (new, 1st rewind, 2nd rewind), Star operation, voltage unbalance, energy efficient motors, soft starters with energy saver, variable speed drives.
- 3.3 **Compressed Air System:** Types of air compressors, reciprocating vs screw, compressor efficiency, efficient compressor operation, Compressed air system components, capacity assessment, leakage test, factors affecting the performance and savings opportunities, Air Driers.
- 3.4 **Heating, ventilation, air conditioning (HVAC) and Refrigeration System:** Introduction to Psychometrics, Vapor compression refrigeration cycle, refrigerants, coefficient of performance, capacity, factors affecting Refrigeration and Air conditioning system performance and savings opportunities. Vapor absorption refrigeration system: Working principle, types and comparison with vapor compression system and saving potential, heat pumps and their applications, section on ventilation system, ice bank system, performance assessment of window and split room air conditioners, Star labeled pumps, cold storage refrigeration, humidification system.
- 3.5 **Fans and blowers:** Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities. Pressure drop calculation.
- 3.6 **Pumps and Pumping System:** Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities. Energy conservation in boiler feed water pump, pumping systems for municipal drinking water, and sewerage, agriculture pump sets.
- 3.7 **Cooling Tower:** Types and performance evaluation, efficient system operation, flow control strategies and energy saving opportunities assessment of cooling towers. fan less cooling tower, natural draft cooling tower, cooling water treatment.
- 3.8 **Lighting System:** Light source, choice of lighting, luminance requirements, and energy conservation avenues. Light Emitting Diodes (LEDs), metal halides, fluorescent tube lights, Compact fluorescent lamps (CFL), labeling scheme, high efficiency street lighting, electronic ballast, occupancy sensors, energy efficient lighting controls.
- 3.9 **Diesel/Natural gas Power Generating systems:** Factors affecting selection, energy performance assessment of diesel conservation avenues. Waste heat recovery.
- 3.10 **Energy conservation in Buildings and Energy Conservation Building Codes (ECBC):** About Energy Conservation Building Codes (ECBC), building envelope, insulation, lighting, Heating, ventilation, air conditioning (HVAC), fenestrations, water pumping, inverter and energy storage/captive generation, elevators and escalators, star labeling for existing buildings, Energy Service Companies based case studies.

PAPER-4: ENERGY PERFORMANCE ASSESSMENT FOR EQUIPMENT AND UTILITY SYSTEMS

Open Book examination on the following energy performance assessments for equipment and utility systems:

- 4.1 Boilers
- 4.2 Furnaces
- 4.3 Cogeneration, Turbines (gas, steam)
- 4.4 Heat Exchangers,
- 4.5 Electric Motors, Variable Speed Drives
- 4.6 Fans and Blowers
- 4.7 Water Pumps
- 4.8 Compressors
- 4.9 HVAC systems
- 4.10 Performing Financial Analysis
- 4.11 Energy Performance assessment in power plants
- 4.12 Energy Performance assessment in steel industry
- 4.13 Energy Performance assessment in process industry (cement and textile)
- 4.14 Energy Performance assessment in buildings and commercial establishments



NATIONAL PRODUCTIVITY COUNCIL, INDIA

The National Productivity Council is a national level organization, founded in 1958 by the Government of India. NPC is an autonomous, tri-partite, non-profit organization with equal representation from the government, employers and workers' organizations, apart from technical and professional institutions and other interests on its governing council. Besides its headquarters at New Delhi, NPC operates through 12 offices in India with 250 highly qualified and experienced specialists representing various disciplines.

Training Institute: Dr. Ambedkar Institute of Productivity (AIP) is a long-term training wing of the National Productivity Council of India. The Institute plays a wider role of running 2 years P.G Programmes and Short-term programmes in Managerial & Technical areas.

Mission: Development, Dissemination and Application of knowledge and experience in productivity, for promoting consciousness and improvement in productivity, with the objective of strengthening the performance and competitiveness of the national economy as well as of improving the working conditions and quality of working life.

Objectives: NPC is aiming to promote the cause of productivity in industry, agriculture, service, infrastructure and other sectors of the economy. It aims to help in achieving sustained all round development in India, leading to enhancement of quality of life of people in general. The concept of productivity as perceived by NPC encompasses not only a more efficient use of resources, but also of quality, environmental protection and integrated economic and social development. NPC aims at promoting these as a part of its objectives and activities. NPC possesses a well-equipped Library-cum-Documentation centre.

Services: Besides providing training, consultancy and undertaking research in the area of productivity, NPC also implements the productivity promotion plans and programmes of the Tokyo based Asian Productivity Organization (APO) an inter-governmental body of which the Government of India is a founder member.

Thrust Areas: NPC also conducts institutional training programmes for the development of consultants in Productivity and Management in the areas of Industrial Engineering, Energy Management & Energy Audit, Environment Management, Plant Engineering, HRD, TPM, TQM, Financial Management, Marketing Management and Agricultural Productivity.

NPC aims at propagating productivity as an evolving concept, which includes attention to special issues, and concerns relating to quality, environment, energy, integrated rural and community development, women workers etc. NPC's thrust is on providing modern and high quality productivity-related services to sectors not adequately addressed by others, especially the small-scale industry and informal sector.

NPC has been active in the area of Energy Conservation & Management for over four decades and has undertaken numerous studies at macro, sectoral and unit levels through its team of committed professionals. It promotes rational use of energy through: Optimization of Methods Improvement, Technology Upgradation and Application of alternative energy sources.

“What we know is only a handful

What we don't know is an ocean

- Avvaiyar, Tamil poet, 2 AD.

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