



**SILIGURI INSTITUTE OF TECHNOLOGY
ELECTRICAL ENGINEERING**



COURSE FILE

4TH YEAR 2ND SEMESTER, 2019

GROUP A/B

PAPER DESCRIPTION : ENERGY MANAGEMENT & AUDIT

PAPER CODE : EE-801C

DEPARTMENT OF ELECTRICAL ENGINEERING

VISION OF THE INSTITUTE :

To be a recognised institution offering high quality education, opportunities to students to become globally employable Engineers/Professionals in best ranked industries and research organisation.

MISSION OF THE INSTITUTE :

To impart quality technical education for holistic development of students who will fulfil the needs of the industry/society and be actively engaged in making a successful career in industry/research/higher education in India & abroad.

VISION OF THE DEPARTMENT:

To emerge as a leading Department of Electrical Engineering that caters to the latest needs of power sector, electrical & allied industry in the region.

MISSION OF THE DEPARTMENT:

To evolve as an innovative & globally competent Electrical Engineering department that contributes to the socio - economic growth of region by utilizing the advancement in Electrical Engineering by providing conducive learning and interactive environment to students and faculty.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Apply science, engineering, mathematics through differential and integral calculus, complex variables to solve electrical engineering problems.

PSO2: Demonstrate proficiency in use of software & hardware to be required to practice Electrical engineering profession.

PROGRAM EDUCATION OBJECTIVE (PEO):

The graduates of Electrical Engineering will:

1. Possess strong educational foundation in science, mathematics and Electrical Engineering which is essential in making successful careers in Industry/ research / higher education and will understand the professional responsibility in modern electrical power and energy related Industry through global and rigorous education.
2. Possess technical competence in the fields of Electrical engineering & allied disciplines and will be successful for the execution of engineering solutions which are technically sound and environment friendly.
3. Utilize their broad based knowledge, skills and resources to design, invent and develop novel technology and find creative and innovative solutions to engineering problems in a multidisciplinary work environment.
4. Be professional with leadership qualities, effective communication skills, ethical attitude and competence to excel individually and work efficiently in teams.
5. Possess attitude to learn and adopt new technologies as it evolves and be lifelong learners.

Siliguri Institute of Technology

Electrical Engineering Department

Academic & Activity Calendar

EVEN SEMESTER 2019 (January to June 2019):

Activity	Date
Commencement of Academic Program	January 14, 2019
Observation of Birthday of Netaji	January 23, 2019
Republic Day Celebration	January 26, 2019
Annual Cultural program (SITEX), Tech-Mgmt Fest & Annual games & sports	Feb 19 to Feb 23, 2019
Student Feedback and submission of ATR (Department Level)	Feb 25 to Feb 28, 2019
1 st Internal Test	March 4 to March 7, 2019
Technical Training	4 th & 6 th Sem B.Tech: March 11 to March 15, 2019
Meeting with the students with Director's Office	March 11 to March 16, 2019
Technical Training	2 nd Sem B.Tech: April 16 to April 20, 2019
2 nd Internal Test	May 2 to May 6, 2019
Observation of Birthday of Rabindranath Tagore	May 9, 2019
Farewell to final Yr. Students	2 nd week of May , 2019
Practical Examinations & Viva – Voce	May 13 to May 20, 2019
Theory Exam	May 23 to June 12, 2019
Summer Break (For students)	June 13 to July 12, 2019

Course File

Course Title : ENERGY MANAGEMENT & AUDIT

Code : EE-801C

Semester 2ND Year 4th

Name of the Faculty: Prof. Jayanta Bhusan Basu / Dr. S. Dawn

Internet Homepage: <https://sites.google.com/site/apjbbasu/>

E-mail : jbb.sit@gmail.com / subhojit.dawn@gmail.com

Class Schedule

Lecture		
Monday 12.30 – 13.20 pm	Tuesday 10.50 – 11.40 am	Wednesday 12.30 – 13.20 pm

Hours for meeting students:

Monday	14.10 -15.00 pm
Tuesday	14.10 -15.00 pm
Friday	14.10 -15.00 pm
Or by appointment	

i) Course Objective

Students will acquire basic knowledge about current energy scenario, energy management, auditing and conservation.

ii) Course Outcomes

- i. After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The student will be able to:

		Target
C801C.1	Demonstrate knowledge about Energy management and energy auditing approaches (BT 2)	Students will attain 65% marks
C801C.2	Explain Energy Scenario. (BT 2)	Students will attain 65% marks
C801C.3	Understand the importance of energy conservation and related policies (BT 2)	Students will attain 65% marks
C801C.4	Explain reasons for climate change and related protocols & adaptations for sustainable development. (BT 2)	Students will attain 65% marks
C801C.5	Discuss about different energy efficient technologies in electrical systems. (BT 3)	Students will attain 65% marks

- ii. Once the student has successfully complete this course, he/she must be able to answer the following questions or perform/demonstrate the following:

Sl.	Question	BT Level
1.	List down the objective of energy management.	BT 2
2.	State the importance of energy policy for industries.	BT 2
3.	Write the benefits of benchmarking energy consumption	BT 3
4.	Explain briefly the difference between preliminary and detailed energy audits	BT 2
5.	Define the following terms with three examples for each - a) Primary and Secondary Energy. b) Commercial and Non-commercial Energy	BT 2
6.	Describe how is economic growth linked to energy consumption?	BT 3
7.	Explain CDM and its objectives.	BT 2
8.	Discuss the main role of UNFCCC?	BT 2
9.	Discuss the benefits of standard & Labeling (S & L)	BT 2
10.	Compute the generation cost per Kwh from the following data. Installed capacity – 200 MW Capital cost – Rs. 3000.00 per Kw Interest & depreciation – 12%	BT 3

Sl.	Question	BT Level
	Fuel consumption – 0.9 Kg/Kw Fuel cost – Rs. 70.00 per Tonnes Misc. cost – 20% of Fuel cost Load Factor – 80% Peak load – 170 MW	
11.	Explain the terms cell, module and array as applicable to photovoltaic.	BT 2
12.	Discuss the criteria for selection of wind mill installation?	BT 3
13.	What are the advantages of energy efficient motors?	BT 2
14.	Explain the working of a soft starter and its advantage over other conventional starters.	BT 3

iii) Topic/Unit/Chapter Layout

Topic/Unit/Chapter	Lecture Hours
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 intervals of EA regulation.	6
Energy Scenario: Commercial and Non-Commercial Energy, Primary Energy Resources, Commercial Energy Production, Final Energy Consumption, Energy Needs of Growing Economy, Long Term Energy Scenario, Energy Pricing, Energy Sector Reforms, Concept of smart grid, Tariff.	6
Energy Conservation Act-2001 and related policies: Energy Conservation Act-2001 and its features, Notification Under the act, Designated agencies, Schemes of Bureau of Energy Efficiency(BEE)-ECBC, S & L, DSM, BLY, SME's, Designated Consumers, Electricity Act 2003, Integrated Energy Policy,	6
Energy Efficiency and Climate changes: Energy and environment, Air pollution, Climate change, United Nations Framework Convention on climate change (UNFCCC), Kyoto Protocol, Clean Development Mechanism (CDM), CDM methodology and Procedures, Sustainable development	6
Non-Conventional Energy Sources: Concept of renewable Energy and importance, Different types of renewable Energy, Solar energy, Wind energy, Biomass energy, Hydro-energy, Fuel cells, Energy from wastes, Wave, Tidal and geothermal. Concept of energy storing device.	6
Energy Efficient Technologies in Electrical Systems: Maximum demand controllers, Automatic power factor controllers, Energy efficient motors, Soft starters with energy saver, Variable speed drives, Energy efficient transformers, Electronic ballast, Occupancy sensors, Energy efficient lighting controls, Energy saving potential of each technology	6

iv) Text books

1. Energy Management Supply and Conservation, Dr. Clive Beggs, Butterworth Heinemann, 2002 .
2. Handbook of Energy Engineering, Albert Thumann & Paul Mehta, The Fairmont Press, INC.
3. Plant Engineers & Manager Guide to Energy Conservation, Albert.
4. Energy Management Handbook, Wayne C, John Willey and Sons

Reference books :

1. NPC energy audit manual and reports
2. Guide to Energy Management, Cape Hart, Turner and Kennedy
3. Cleaner Production – Energy Efficiency Manual for GERIAP, UNEP, Bangkok prepared by National Productivity Council
4. www.bee.org

(v) Evaluation Scheme

1) Theory

Evaluation Criteria	Marks
Internal Exam*	15
Quiz / assignment	10
Attendance	5
University Exam/External Exam	70
Total	100

* Two internal examinations are conducted; based on those two tests, average of them are considered in a scale of 15.

Course target attainment levels:

Attainment Level	Inference	Marks
Attainment Level 1	50% of the students have attained more than the target level of that CO	1
Attainment Level 2	60% of the students have attained more than the target level of that CO	2
Attainment Level 3	70% of the students have attained more than the target level of that CO	3

Course Target for the university examination = 65% of the students will get “A” Grade

Target has been set on the basis of last year’s performance / result by the students, student quality this year and difficulty level of the course.

University Grading System:

Grade	Marks
O	90% and above
E	80 – 89.9%
A	70 – 79.9%
B	60 – 69.9%
C	50 – 59.9%
D	40 – 49.9%
F	Below 40%

(vi) Mapping of Course Outcomes and Program Outcomes:

Course Outcomes	Program Outcomes												PSOs	
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	1.	2.
EE801C.1	-	2	-	-	-	-	2	-	-	-	1	1	2	-
EE801C.2	2	-	-	-	-	-	2	-	-	-	1	1	2	-
EE801C.3	2	2	-	-	-	3	3	-	-	-	1	1	2	-
EE801C.4	2	2	-	-	-	3	3	-	-	-	-	1	1	-
EE801C.5	2	2	-	-	-	2	3	-	-	-	-	1	3	-
EE801C	2	2	-	-	-	3	3	-	-	-	1	1	2	-

1 = courses in which the student will be exposed to a topic

2 = courses in which students will gain competency in that area

3 = courses in which students will master that skill

- CO1 requires finding engineering solution by the understanding of societal impact in present scenario and basic knowhow of financial conditions to provide long term solutions for energy problems. Hence it is partially linked with PO2, PO7 & PSO1 and minimally linked with PO11 & PO12.
- CO2 requires application of engineering knowledge & understanding of environmental contexts and also requires knowledge of engineering to provide long lasting solutions of energy problem. Hence it is partially linked with PO1, PO7 & PSO1 and minimally linked with PO11 & PO12.
- CO3 requires knowledge about application of engineering knowledge & understanding of environmental contexts and providing economical engineering solutions for intelligent consumption of energy which is sustainable in long term. Hence it is highly linked with PO6 & PO7, partially linked with PO1, PO2 & PSO1 and minimally linked with PO11 & PO12.
- CO4 requires knowledge about understanding of engineering knowledge & understanding of environmental conditions to assess societal application and providing sustainable engineering solutions in long term. Hence it is highly linked with PO6 & PO7, partially linked with PO1, PO2 and minimally linked with PO12 & PSO1.
- CO5 deals with different energy efficient technologies in electrical systems which requires good engineering knowledge so that environment friendly sustainable solutions can be found for energy related problems. Hence it is highly linked with PO7 & PSO1, partially linked with PO1, PO2 & PO6 and minimally linked with PO12.

(vii) Assessment Methodology

Outcome	Assessment Tool
EE801C.1	Internal Test, Quiz, University Exam
EE801C.2	Internal Test, Quiz, University Exam
EE801C.3	Internal Test, Quiz, University Exam
EE801C.4	Internal Test, Quiz, University Exam
EE801C.5	Internal Test, Quiz, University Exam

(viii) A. Weekly Lesson Plan

Week	Lectures
1	<p>Discussion of Course outcome and program outcome.</p> <p>Energy Management & Audit:</p> <ul style="list-style-type: none">• Definition• Energy audit- need• Types of energy audit• Energy management (audit) approach-understanding energy costs• Bench marking• Energy performance
2	<p>Energy Management & Audit:</p> <ul style="list-style-type: none">• Matching energy use to requirement• Maximizing system efficiencies• Optimizing the input energy requirements• Fuel and energy substitution• Energy audit instruments and intervals of EA regulation.
3	<p>Energy Scenario:</p> <ul style="list-style-type: none">• Commercial and Non-Commercial Energy• Primary Energy Resources• Commercial Energy Production• Final Energy Consumption• Energy Needs of Growing Economy• Long Term Energy Scenario
4	<p>Energy Scenario:</p> <ul style="list-style-type: none">• Energy Pricing• Energy Sector Reforms• Concept of smart grid• Tariff

Week	Lectures
5	<p>Energy Conservation Act-2001 and related policies:</p> <ul style="list-style-type: none"> • Energy Conservation Act-2001 and its features • Notification Under the act • Designated agencies • Schemes of Bureau of Energy Efficiency(BEE) <ul style="list-style-type: none"> ○ ECBC ○ S & L
6	<p>Energy Conservation Act-2001 and related policies:</p> <ul style="list-style-type: none"> • Schemes of Bureau of Energy Efficiency(BEE) <ul style="list-style-type: none"> ○ ECBC ○ DSM ○ BLY ○ SME's ○ Designated Consumers • Electricity Act 2003 • Integrated Energy Policy
7	<p>Energy Efficiency and Climate changes:</p> <ul style="list-style-type: none"> • Energy and environment • Air pollution • Climate change • United Nations Framework Convention on climate change (UNFCCC)
8	<p>Energy Efficiency and Climate changes:</p> <ul style="list-style-type: none"> • Kyoto Protocol • Clean Development Mechanism (CDM) • CDM methodology and Procedures • Sustainable development
9	<p>Non-Conventional Energy Sources:</p> <ul style="list-style-type: none"> • Concept of renewable Energy and importance • Different types of renewable Energy • Solar energy • Wind energy • Biomass energy
10	<p>Non-Conventional Energy Sources:</p> <ul style="list-style-type: none"> • Hydro-energy • Fuel cells • Energy from wastes • Wave energy • Tidal energy • Geothermal energy • Concept of energy storing device
11	<p>Energy Efficient Technologies in Electrical Systems:</p> <p>Maximum demand controllers</p>

Week	Lectures
	Automatic power factor controllers Energy efficient motors Soft starters with energy saver
12	Energy Efficient Technologies in Electrical Systems: Variable speed drives Energy efficient transformers Electronic ballast Occupancy sensors Energy efficient lighting controls Energy saving potential of each technology

(VIII) B. COMBINED DAILY LESSON PLAN & EXECUTION REPORT

NAME OF FACULTY : Mr. J. B. Basu / Dr. S. Dawn	DEPARTMENT :EE	SUBJECT: ENERGY MANAGEMENT & AUDIT CODE : EE-801C	SEMESTER : 8th
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Unit / Module	Topic Description (to be quoted from syllabus)	No. of Lecture(s)	Plan Date(s)	Execution Date(s)	Details of home work/assignment/mini project/ ICT used/ partial delivery of courses by industry experts, Eminent speakers etc.)	Details of topics that are beyond syllabus (if any)	Remarks
	Introduction	01					
	Discussion of Course outcome and program outcome. Overview of the course.	1	14.01.2019	21.01.2019	Students were asked to determine the connected load in their classroom		
1	Energy Management & Audit:	06					
	Definition, Energy audit-need, Types of energy audit		15.01.2019	22.01.2019		Discussed about Energy policy & Energy statement. Shown a sample energy policy statement of Heineken	
	Energy management (audit) approach-understanding energy costs, Bench marking		16.01.2019	28.01.2019			
	Energy performance, Matching energy use to requirement		21.01.2019	29.01.2019			
	Maximizing system efficiencies, Optimizing the input energy		22.01.2019	30.01.2019			

Unit / Module	Topic Description (to be quoted from syllabus)	No. of Lecture(s)	Plan Date(s)	Execution Date(s)	Details of home work/assignment/mini project/ ICT used/ partial delivery of courses by industry experts, Eminent speakers etc.)	Details of topics that are beyond syllabus (if any)	Remarks
	requirements						
	Fuel and energy substitution		28.01.2019	04.02.2019			
	Energy audit instruments and intervals of EA regulation		29.01.2019	05.02.2019	Students were asked to measure current using Clamp Meter.		
2	Energy Scenerio	06					
	Commercial and Non-Commercial Energy, Primary Energy Resources, Commercial Energy Production,		30.01.2019	06.02.2019			
	Final Energy Consumption, Energy Needs of Growing Economy		04.02.2019	11.02.2019			
	Long Term Energy Scenario		05.02.2019	12.02.2019			
	Energy Pricing, Energy Sector Reforms		06.02.2019	13.02.2019			
	Concept of smart grid		11.02.2019	04.03.2019	Students were asked to collect information on the smart grid project in Siliguri		
	Tariff		12.02.2019	05.03.2019			
3	Energy Conservation Act-2001 and related policies:	06					
	Energy Conservation Act-2001 and its features,		13.02.2019	06.03.2019			
	Notification Under the act, Designated agencies		18.02.2019	11.03.2019			
	Schemes of Bureau of Energy Efficiency(BEE)-ECBC, S & L, DSM, BLY, SME's,		26.02.2019	12.03.2019			

Unit / Module	Topic Description (to be quoted from syllabus)	No. of Lecture(s)	Plan Date(s)	Execution Date(s)	Details of home work/assignment/mini project/ ICT used/ partial delivery of courses by industry experts, Eminent speakers etc.)	Details of topics that are beyond syllabus (if any)	Remarks
	Designated Consumers		27.02.2019	13.03.2019			
	Electricity Act 2003		04.03.2019				
	Integrated Energy Policy		05.03.2019	25.03.2019			
4	Energy Efficiency and Climate changes	06					
	Energy and environment,		06.03.2019	26.03.2019			
	Air pollution		11.03.2019				
	Climate change, United Nations Framework Convention on climate change (UNFCCC)		12.03.2019	01.04.2019			
	Kyoto Protocol		13.03.2019	02.04.2019			
	Clean Development Mechanism (CDM)		18.03.2019	03.04.2019			
	CDM methodology and Procedures, Sustainable development		19.03.2019				
5	Non-Conventional Energy Sources:	06					
	Concept of renewable Energy and importance, Different types of renewable Energy,		20.03.2019	29.04.2019			
	Solar energy, Wind energy		25.03.2019	30.04.2019 06.05.2019			
	Biomass energy, Hydro-energy		26.03.2019	07.05.2019			
	Fuel cells, Energy from wastes		27.03.2019	08.05.2019 13.05.2019			
	Wave, Tidal and geothermal		01.04.2019	13.05.2019			

Unit / Module	Topic Description (to be quoted from syllabus)	No. of Lecture(s)	Plan Date(s)	Execution Date(s)	Details of home work/assignment/mini project/ ICT used/ partial delivery of courses by industry experts, Eminent speakers etc.)	Details of topics that are beyond syllabus (if any)	Remarks
	Concept of energy storing device		02.04.2019				
6	Energy Efficient Technologies in Electrical Systems:	06					
	Maximum demand controllers, Automatic power factor controllers,		03.04.2019	08.04.2019			
	Energy efficient motors,		08.04.2019	09.04.2019			
	Soft starters with energy saver		09.04.2019	10.04.2019			
	Variable speed drives, Energy efficient transformers,		10.04.2019	22.04.2019			
	Electronic ballast, Occupancy sensors		16.04.2019	23.04.2019			
	Energy efficient lighting controls, Energy saving potential of each technology		17.04.2019	24.04.2019			
	Recapitulation of the course & discussions on the previous year's University question papers	1	22.04.2019	13.05.2019			

(ix) Teaching Strategy/Method

1. Learning by example
2. Learning by question and answering
3. Learning by problem solving
4. Use of Power point presentation.
5. Use of animations to understand the working principles.

(ixa) Strategy to support weak students

1. Reviewing student attendance in connection with performance, and counselling students about attending classes, advising them for making up classes missed and getting additional help.
2. Paying attention to their problems in understanding the subject
3. Encouraging them to express their point of trouble
4. Allotting extra time beyond schedules class hours to help them understand the topics
5. Suggesting them different ways (as found suitable depending upon the case) to overcome their problem.

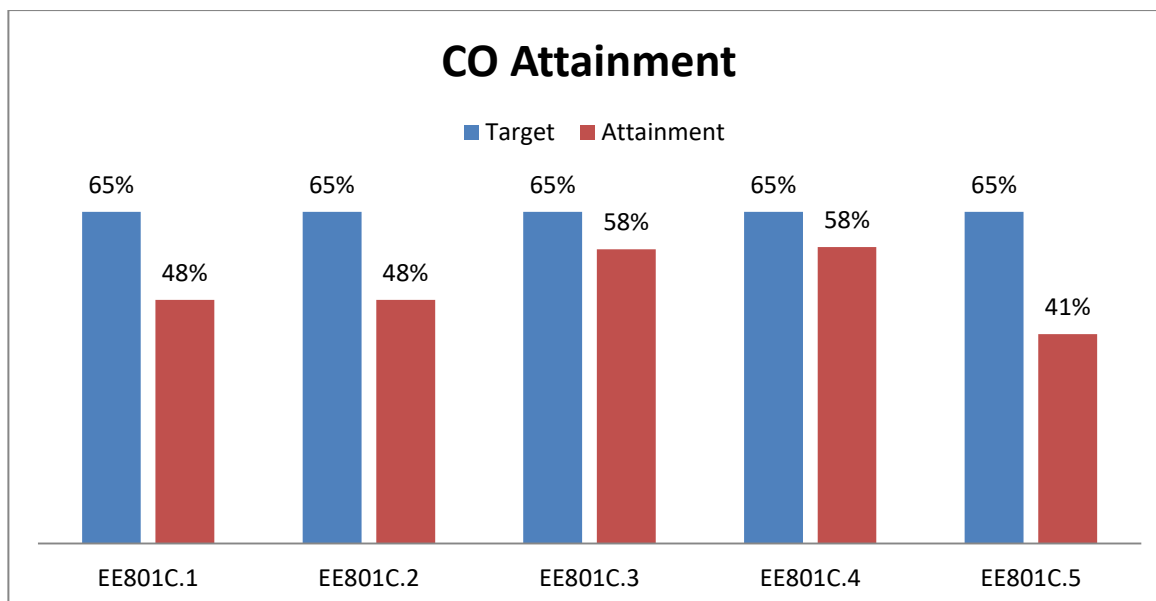
(ixb) Strategy to encourage bright students

1. Try to encourage them to study beyond the syllabus
2. Ask them to develop the habit of reading anything good and rich in content to update their knowledge about the development in the field of renewable energy.
3. Encourage them to help academically weak students.
4. Encourage them to do mini projects.

(ixc) Efforts to keep students engaged

1. summarize the previous day's lecture and ask random questions.
2. Providing informative data/examples/case study related to the topic from the industrial point of view.
3. Conducting Informal technical quiz/surprise tests.

(xi) Analysis of Students performance in the course



- 48% students have attained the set target of 65% marks for EE801C.1
- 48% students have attained the set target of 65% marks for EE801C.2
- 58% students have attained the set target of 65% marks for EE801C.3
- 58% students have attained the set target of 65% marks for EE801C.4
- 41% students have attained the set target of 65% marks for EE801C.5

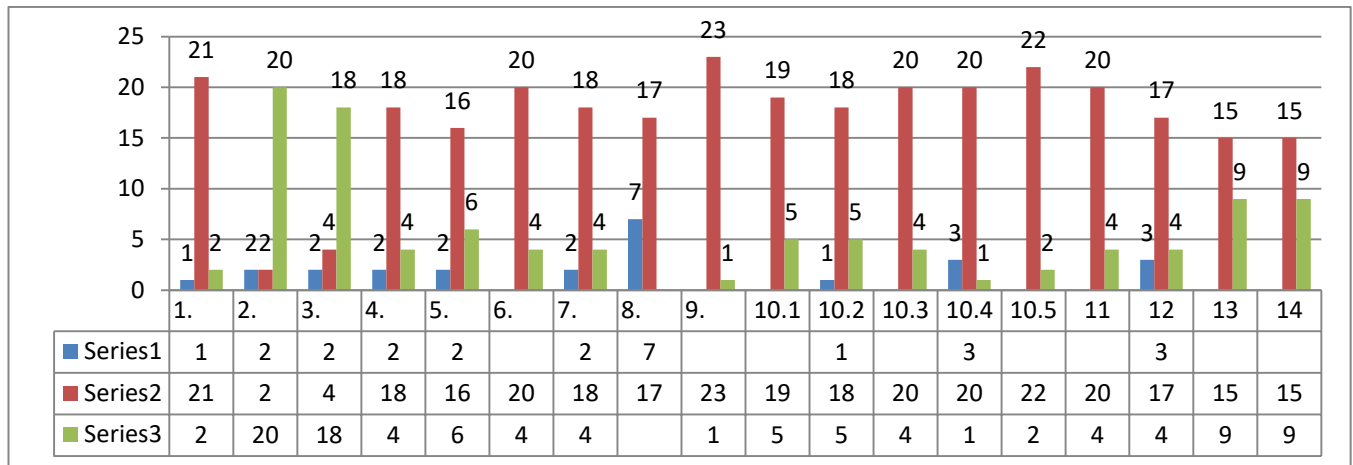
(xii) Analysis of Students performance in the course (university results)

	Target Course Outcome%	TOTAL STUDENTS	TOTAL STUDENT WHO ATTAINED OUTCOME	% STUDENTS WHO ATTAINED THE OUTCOME
University	7	78	76	97%

- 97% students have attained the set target of 7 in point for University Exams

(xiii) Analysis of Student Feed Back

Feedback is taken from 24 students based on the course survey.



(xiv) Teacher Self-Assessment (at the completion of course)

From the analysis of the results obtained it can be seen that set targets for the course outcome have been achieved moderately by the students. Since this course encompasses a wide range of activities and expertise in the optimal use of energy hence some hands-on activities will provide practical exposure for better understanding the course.

(xiv) Recommendations/Suggestions for improvement by faculty

This is a course which requires conceptual understanding of the subject. Students are needed to be motivated to understand the importance energy management & audit. They need to be motivated to understand the environmental impact due to energy consumption and the role of budding engineers to curb the same. Some practical case studies and views of industry expert will help the students to realise the importance of the subject.

INTERNAL ASSESSMENT RECORD

Subject with code: ENERGY MANAGEMENT & AUDIT (EE-801C)

Section: A / B

Semester :8th

Discipline: Electrical Engineering

Sl.	Roll No.	Name	Attendance		Internal Examination			Quiz/Assignment			Total
			Total (%)	Marks	1st	2nd	Evaluated	Quiz	Assignment	Evaluated	
1	11901615001	AISHIKA NANDY	0.74	3	34	16	8	9	10	10	22
2	11901615002	AMARTYA SUR	0.65	3	22	0	3	7	10	8	18
3	11901615003	AMIT MONDAL	0.71	3	19	10	4	8	10	9	20
4	11901615004	ANJUM IQBAL	0.56	3	0	12	2	6	0	8	17
5	11901615005	ANKITA CHAKRABORTY	0.74	3	33	16	7	6	10	8	17
6	11901615006	ANUPAMA PRASAD	0.71	3	24	20	7	5	0	3	11
7	11901615007	ANWESHA KAR	0.65	3	25	15	6	9	10	9	21
8	11901615008	ANWESHA MAITRA	0.62	3	28	0	4	6	0	3	11
9	11901615009	APARUPA DEY	0.59	3	33	28	9	6	10	8	16
10	11901615010	ARCHISHMAN DAS	0.71	3	23	24	7	0	10	5	8
11	11901615011	ARPITA SARKAR	0.62	3	32	13	7	4	10	7	13
12	11901615012	ARUNIMA BHATTACHARYYA	0.71	3	27	22	7	4	10	7	13
13	11901615013	ARUNIMA PAUL	0.59	3	37	15	8	7	10	9	19
14	11901615014	BARNAMOY CHOWDHURY	0.68	3	25	0	4	0	0	0	3
15	11901615015	CHANDRIKA MUKHOPADHYAYA	0.62	3	21	12	5	7	10	8	18
16	11901615016	DEBARATI PAL	0.53	3	22	10	5	7	10	9	19
17	11901615017	DEBJYOTI DEY	0.62	3	0	13	2	1	10	6	10
18	11901615018	DEBOPAM KUMAR ROY	0.71	3	17	13	5	0	10	7	10
19	11901615019	DEEPJYOTI ROY	0.50	3	27	0	4	7	10	8	18
20	11901615020	DIPAYAN KAR	0.74	3	22	0	3	6	0	3	12
21	11901615021	EATHENA DUTTA	0.62	3	23	27	8	7	10	8	18
22	11901615023	INDRAJIT BASAK	0.62	3	0	9	1	0	0	0	3
23	11901615024	ISHITA BARMAN	0.62	3	0	8	1	6	10	8	16
24	11901615025	JALIMA KHATUN	0.62	3	24	11	5	6	10	8	17
25	11901615026	JAYSHANKHA PAL CHOWDHURY	0.62	3	20	8	4	0	0	0	3
26	11901615027	JOYRUP SINGH	0.44	3	28	10	6	0	0	0	3
27	11901615028	JYOTIRMOY MAHATO	0.71	3	31	2	5	9	10	9	21
28	11901615029	KISHOR KUMAR THAKUR	0.59	3	33	13	7	5	10	8	16
29	11901615030	KUNDAN KUMAR	0.76	3	26	4	5	6	10	8	16
30	11901615031	KUNZANG GYAMTSO DUKPA	0.59	3	0	14	2	6	10	8	16
31	11901615032	LEE YANG FUNG	0.50	3	35	12	7	9	10	9	21

Sl.	Roll No.	Name	Attendance		Internal Examination			Quiz/Assignment			Total
			Total (%)	Marks	1st	2nd	Evaluated	Quiz	Assignment	Evaluated	
32	11901615033	MD MINHAZ ALAM	0.74	3	34	0	5	0	0	0	3
33	11901615034	MD. SAHARUK	0.59	3	28	0	4	0	10	5	8
34	11901615035	MD.WAIJ ALI	0.68	3	22	20	6	9	10	9	21
35	11901615036	MITHLESH KUMAR	0.62	3	24	8	5	0	0	7	10
36	11901615037	MITHUN KUMAR	0.59	3	29	15	7	0	10	5	8
37	11901615038	PRANOY THAPA	0.56	3	26	16	6	10	0	5	17
38	11901615039	PRAYAG TAMANG	0.76	3	30	7	6	5	0	6	14
39	11901615040	PRITAMBAR MONDAL	0.62	3	18	10	4	10	10	10	23
40	11901615041	PROJOY ROY	0.68	3	37	2	6	10	10	10	22
41	11901615042	RAJDEEP BARMAN	0.62	3	28	2	5	6	10	8	16
42	11901615043	RAJDEEP MALAKAR	0.59	3	26	0	4	0	0	0	3
43	11901615045	REBATI RAY	0.65	3	25	12	6	0	0	0	3
44	11901615046	RIJU MANDAL	0.68	3	29	0	4	0	10	7	10
45	11901615047	ROJIKA DARNAL	0.74	3	21	14	5	2	0	1	5
46	11901615048	SABYASACHI MUKHERJEE	0.65	3	37	6	6	7	10	8	18
47	11901615049	SAIKAT SARKAR	0.68	3	0	16	2	2	10	6	10
48	11901615050	SAMIR RAJAK	0.65	3	0	15	2	3	0	1	7
49	11901615051	SHAHID ANSARI	0.59	3	33	13	7	6	10	8	16
50	11901615052	SHUBHAM KUMAR	0.79	3	21	18	6	3	10	7	13
51	11901615053	SIBANSU GHOSH	0.71	3	28	12	6	8	10	9	19
52	11901615054	SIDDHARTH RAI	0.65	3	20	18	6	0	0	0	3
53	11901615055	SNIGDHA CHAKRABORTY	0.53	3	37	7	7	3	10	7	13
54	11901615056	SNIGHDHA DAS	0.62	3	35	28	9	5	10	8	16
55	11901615057	SOMRAJ ROY	0.71	3	34	15	7	7	10	8	18
56	11901615058	SONIA PAUL	0.71	3	12	0	2	1	10	6	10
57	11901615059	SOURAV DEBNATH	0.74	3	24	0	4	7	0	3	13
58	11901615060	SOURAV DUTTA	0.79	3	21	19	6	7	10	8	18
59	11901615061	SOYEL PERVES	0.68	3	17	0	3	9	10	10	22
60	11901615062	SUBAN ROY	0.74	3	20	0	3	10	10	10	22
61	11901615063	SUBHAJIT DAS	0.53	3	25	0	4	6	10	8	17
62	11901615064	SUBHAM DAS	0.74	3	0	17	3	7	10	8	18
63	11901615065	SUBHAMAY BANIK	0.68	3	18	14	5	0	0	8	11
64	11901615066	SUBHOBRATA PANJA	0.74	3	0	20	3	5	10	8	16
65	11901615067	SUMAN KUMAR	0.74	3	13	12	4	8	10	9	19
66	11901615068	SUSMITA GUHA SARKAR	0.56	3	26	33	9	7	10	9	19
67	11901615069	WAQAR AHMED	0.65	3	0	12	2	5	10	8	16
68	11901616002	SUMAN ROY	0.74	3	28	19	7	5	10	8	16
69	11901616003	SUBHAM BHOWAL	0.82	4	19	23	6	0	10	5	9
70	11901616004	SRIJOY HORE	0.65	3	25	6	5	0	0	0	3
71	11901616005	SOURAV DATTA	0.76	3	6	21	4	7	10	8	18
72	11901616006	SHARMISTHA KARJEE	0.82	4	0	15	2	0	10	5	9
73	11901616007	RESHMA GIRI	0.56	3	0	19	3	7	10	8	18
74	11901616008	RAKESH GURUNG	0.68	3	0	0	0	0	0	8	11
75	11901616009	NEHAL SHARMA	0.71	3	0	24	4	7	0	3	13
76	11901616010	MAINAK BISWAS	0.65	3	14	15	4	5	10	8	16
77	11901616011	BHASKAR ROY	0.71	3	40	25	10	9	10	9	21
78	11901616012	ARUP SARKAR	0.74	3	28	9	6	0	10	8	11

NAME WITH ROLL NO.s OF STUDENT WHOSE ACADEMIC PERFORMACE IS NOT SATISFACTORY

Gr.	Roll No.	Name of Student	Remedial measures taken by teacher
A/B	11901615014	BARNAMOY CHOWDHURY	<ul style="list-style-type: none">• Additional doubt clearing sessions beyond the class hours• Providing extra assignments to students.• Asking them to solve previous question papers.• Highlighting important and frequently asked questions
	11901615023	INDRAJIT BASAK	
	11901615026	JAYSHANKHA PAL CHOWDHURY	
	11901615027	JOYRUP SINGH	
	11901615033	MD MINHAZ ALAM	
	11901615043	RAJDEEP MALAKAR	
	11901615045	REBATI RAY	
	11901615054	SIDDHARTH RAI	
	11901616004	SRIJOY HORE	

CERTIFICATE

I, the undersigned, have completed the course allotted to me as shown below

Sl. No.	Semester	Subject with Code	Total Units/ Chapters	Remarks

Date :

Signature of Faculty

Submitted to HOD

Certificate by HOD

I, the undersigned, certify that.....has completed the course work allotted to him / her satisfactorily / not satisfactorily.

Date :

Signature of HOD

Submitted to Principal/Director

Date :

Signature of Principal/Director

Student Feedback on Course Objectives & Outcomes

Faculty Prof. Jayanta Bhusan Basu
Course code EE-801C

Semester 2nd **Year** 4th
Course Title Energy Management & Audit

Dear Students

This feedback that I intend to take from you is very precisely about fulfillment of course objectives and course outcomes. My course objectives and course outcomes are as follows that I had shared with you in the beginning of the semester, the same is repeated here.

Course Objectives

Students will acquire basic knowledge about current energy scenario, energy management, auditing and conservation.

Course Outcomes

The students will be able to:

- EE801C.1 - Demonstrate knowledge about Energy management and energy auditing approaches (BT 2)
- EE801C.2 - Explain Energy Scenario. (BT 2)
- EE801C.3 - Understand the importance of energy conservation and related policies (BT 2)
- EE801C.4 - Explain reasons for climate change and related protocols & adaptations for sustainable development. (BT 2)
- EE801C.5 - Discuss about different energy efficient technologies in electrical systems. (BT 3)

The survey questions below has been designed to obtain your feedback so as to determine the extent of attainment of the intended course objectives and course outcomes.

1 = Poor 2= Good 3= Excellent

1.	Parameter	1	2	3
2.	The course description shared with me in the first week of the semester was adequate for me to understand what I should expect to achieve in the course			
3.	The course schedule through the semester was			
4.	The entire course contents were covered during the semester			
5.	How was your performance in the course			
6.	The relevance of this course to your career goals was			
7.	The work load for the course was			
8.	At the end of the semester the coverage of the stated course objectives and course outcomes by teacher was			
9.	The text books for the course were			
10.	Coverage of course beyond syllabus			
11.	The relevance of laboratory experiment to the course outcomes was:			
12.	Through the course, got the opportunity and confidence to:			
	<ul style="list-style-type: none">• Identify different Renewable and Non Renewable Energy Sources and realize their environmental impact (BT 2)			
	<ul style="list-style-type: none">• Illustrate Solar geometry and describe different methods of solar energy conversion. (BT 3)			
	<ul style="list-style-type: none">• Demonstrate knowledge about Working Principles of Wind Power generation and its application. (BT 3)			
	<ul style="list-style-type: none">• Explain generation & harnessing of power from Biomass, Geothermal, ocean energy. (BT 3)			
	<ul style="list-style-type: none">• Discuss about different direct energy conversion systems like MHD & Fuel cells. (BT 3)			
13.	The relevance of assignment to the course outcomes was:			
14.	The relevance of quiz to the course outcomes was:			
15.	The relevance of questions in internal exams to the course outcomes was:			
16.	The course was conducted in an interactive teaching-learning environment :			
17.	Your overall impression of this course, independent of the teacher, was			

Thank You

Department of EE

Quiz-1,

Paper Name: ENERGY MANAGEMENT & AUDIT,

Paper Code: EE-801C,

F.M-07 (ALL QUESTIONS ARE OF EQUAL MARKS)

1. Energy consumption per unit of GDP is called as EE801C.1
 - a. Energy Ratio
 - b. Per capita consumption
 - c. Energy intensity**

2. Name the Act, which is proposed to bring the qualitative transformation of the electricity sector EE801C.1
 - a. Regulatory Commission Act 1998
 - b. Supply Act 1948
 - c. Electricity Act 2003**
 - d. Indian Electricity Act 1910

3. "The judicious and effective use of energy to maximise profits and enhance competitive positions". This can be the definition of: EE801C.1
 - a. Energy conservation
 - b. Energy management**
 - c. Energy policy
 - d. Energy Audit

4. Replacement of steam based hot water generation by solar system is an example of EE801C.1
 - a. Matching energy usage to the requirement
 - b. Performance improvement
 - c. Maximising system efficiency
 - d. Energy substitution**

5. Which instrument is used to monitor O₂, CO in flue gas? EE801C.1
 - a. Power analyser
 - b. Combustion analyser**
 - c. Pyrometer
 - d. Fyrite

6. Non contact speed measurements can be carried out by EE801C.1
 - a. Tachometer
 - b. Oscilloscope
 - c. Speedometer
 - d. Stroboscope**

7. Energy manger should be well versed with EE801C.1
 - a. Manufacturing and processing skills
 - b. Managerial and technical skills**
 - c. Technical and marketing skills
 - d. Managerial and commercial skills

Department of EE

Quiz-2,

Paper Name: ENERGY MANAGEMENT & AUDIT,

Paper Code: EE-801C,

F.M-13 (ALL QUESTIONS ARE OF EQUAL MARKS)

1. The energy sources, that are either found or stored in nature are: (EE801C.2)
A. Secondary Energy Sources
B. Primary Energy Sources
C. Both Primary & Secondary sources
2. Indian per capita energy consumption is _____ of the world average. (EE801C.2)
A. 1 B. 4 C. 10 **D. 20**
3. AMI means (EE801C.2)
A. Automated Metering Instrument B. Alternate Metering Instrument
C. Advanced Metering Instrument **D. Advanced Metering Infrastructure**
4. Bureau of Energy Efficiency (BEE) has been established in the Year (EE801C.3)
A. 2001 **B. 2002** C. 2003 D. 2004
5. "A public expression of organisation's commitment to energy conservation and environmental protection" is called as (EE801C.3)
A. Company policy B. Management philosophy
C. Energy policy D. Corporate plan
6. Which one of the following is a positive force towards achieving goal of reduced energy consumption? (EE801C.3)
A. tax on energy consumption B. competing corporate priorities
C. Insufficient financial resources to fund D. Absence of corporate energy policy
7. Under Energy Conservation of Act 2001, data on energy consumed & action on recommendations of accredited energy auditor should be reported to (EE801C.3)
A. BEE and state level agency once a year
B. BEE and state level agency twice year
C. BEE only
D. State level designated agency only
8. The United Nations Framework Convention on Climate Change, UNFCCC was signed in the year (EE801C.4)
A. 1990 B. 1991 **C. 1992** D. 1993
9. Kyoto protocol addresses the issues of (EE801C.4)
A. Biodiversity Conservation B. Ground water pollution
C. Climate change D. Soil Pollution
10. For sustainable development in developing countries, Kyoto protocol defines the Clean Development Mechanism, CDM (EE801C.4)
A. true B. false
11. The core used in Energy Efficient Transformer is made of (EE801C.5)
A. silicon alloyed iron **B. metallic glass alloy** C. Ferrite core D. Air core
12. Typical loss in conventional magnetic chokes for a 40 W FTL is of the order of (EE801C.5)
A. 8 Watts B. 14 Watts C. 20 Watts D. 6 Watts
13. Occupancy Sensors can be used in Energy Efficient Lighting Controls (EE801C.5)
A. True B. False

Siliguri Institute of Technology
Department of Electrical Engineering
B. Tech. 4th Year 8th Semester 1st Internal Examination, 2019

Paper Name: Energy Management & Audit
Full Marks: 50

Paper Code: EE-801C
Time: 1h 30m

Answer all questions:

Question 1.	(Aligned to C801C.1)	10
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State in your own words what are the principles of energy management?

OR

Explain briefly about the steps involved in conducting detailed energy audits.

Question 2.	(Aligned to C801C.1)	10
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Write down the responsibilities & duties of an energy manager.

OR

What are the benefits of benchmarking energy consumption?

Question 3.	(Aligned to C801C.1)	10
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What do you understand by the term fuel substitution? Give examples.

OR

What are the various steps in the implementation of energy management in an organization?

Question 4.	(Aligned to C801C.2)	10
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Define the following terms with two examples for each -

- a) Primary and Secondary Energy.
- b) Commercial and Non-commercial Energy.
- c) Renewable and Non-renewable Energy

OR

Define smart Grid. Discuss the advantages of smart grid.

Question 5.	(Aligned to C801C.2)	10
--------------------	-----------------------------	-----------

A factory has a maximum load of 240 kW at 0.8 p.f. lagging with an annual consumption of 50,000 units. The tariff is Rs. 50 per kVA of maximum demand plus 10 paise per unit. Calculate the flat rate of energy consumption. What will be annual saving if p.f. is raised to unity.

Siliguri Institute of Technology
Department of Electrical Engineering

B. Tech. 4th Year 8th Semester 2nd Internal Examination, 2019

Paper Name: Energy Management & Audit

Paper Code: EE-801C

Full Marks: 50

Time: 1h 30m

Answer all questions:

Question 1.	(Aligned to C801C.3)	10
--------------------	-----------------------------	-----------

Briefly discuss the energy scenario in India and the importance of new and renewable energy sources to meet the energy requirement.

OR

Mention some of the long-term energy strategies available for the better energy secured nation?

Question 2.	(Aligned to C801C.4)	10
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Explain effects of Ozone layer depletion.

OR

Explain clean development mechanism (CDM) with its methodology and procedures

Question 3.	(Aligned to C801C.4)	10
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What are the criteria for selection of wind mill installation?.

OR

What do you mean by photovoltaic? Explain the terms cell, module and array as applicable to photovoltaic

Question 4.	(Aligned to C801C.5)	10
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Explain the principle of automatic power factor controller.

OR

Explain the working of a soft starter and its advantage over other conventional starters.

Question 5.		5x2=10
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A. The objective of energy management includes **(C801C.1)**

- i) Minimising energy costs ii) minimising waste iii) Minimising environmental degradation*
iv) all of these

B. Inexhaustible energy sources are known as **(C801C.2)**

- i) commercial Energy ii) renewable Energy iii) primary energy iv) secondary energy*

C. The Sector which is not a Designated consumer as per the latest Gazette is **(C801C.3)**

- i) Railways ii) Iron & Steel iii) Thermal Power plants iv) Commercial Buildings*

D. The agency to look after the climate changes and for action to cut GHG is **(C801C.4)**

- i) UNFCCC ii) WHO iii) DOE iv) GOI*

E. Typical loss in conventional magnetic chokes for a 40 W FTL is of the order of **(C801C.5)**

- i) 8 Watts ii) 14 Watts iii) 20 Watts iv) 6 Watts*

TERM PAPER FOR 8TH SEM EE

Last Date of submission: 30.04.2019

SUB : ENERGY MANAGEMENT & AUDIT

PAPER CODE : EE-801C

SL	ROLL	NAME	TOPIC FOR THE TERM PAPER
1	11901615001	AISHIKA NANDY	Need & strategy for Energy Management
2	11901615002	AMARTYA SUR	
3	11901615003	AMIT MONDAL	
4	11901615004	ANJUM IQBAL	
5	11901615005	ANKITA CHAKRABORTY	Energy scenario in India in terms of overall production & consumption
6	11901615006	ANUPAMA PRASAD	
7	11901615007	ANWESHA KAR	
8	11901615008	ANWESHA MAITRA	Need of Energy conservation in Indian energy scenario
9	11901615009	APARUPA DEY	
10	11901615010	ARCHISHMAN DAS	
11	11901615011	ARPITA SARKAR	Role of Bureau of Energy Efficiency (BEE) in energy conservation program in India
12	11901615012	ARUNIMA BHATTACHARYYA	
13	11901615013	ARUNIMA PAUL	
14	11901615014	BARNAMOY CHOWDHURY	Objectives under energy policy of India
15	11901615015	CHANDRIKA MUKHOPADHYAYA	
16	11901615016	DEBARATI PAL	
17	11901615017	DEBJYOTI DEY	Potential of Energy conservation in India in various sectors
18	11901615018	DEBOPAM KUMAR ROY	
19	11901615019	DEEPIYOTI ROY	
20	11901615020	DIPAYAN KAR	Present Indian Power Sector & its future prospect
21	11901615021	EATHENA DUTTA	
22	11901615023	INDRAJIT BASAK	
23	11901615024	ISHITA BARMAN	Energy saving measures to conserve energy in offices
24	11901615025	JALIMA KHATUN	
25	11901615026	JAYSHANKHA PAL CHOWDHURY	
26	11901615027	JOYRUP SINGH	Need & objective of Demand Side Management (DSM)
27	11901615028	JYOTIRMOY MAHATO	
28	11901615029	KISHOR KUMAR THAKUR	
29	11901615030	KUNDAN KUMAR	Need & objective of Demand Side Management (DSM)
30	11901615031	KUNZANG GYAMTSO DUKPA	
31	11901615032	LEE YANG FUNG	
32	11901615033	MD MINHAZ ALAM	Need & objective of Demand Side Management (DSM)
33	11901615034	MD. SAHARUK	
34	11901615035	MD.WAIJ ALI	
35	11901615036	MITHLESH KUMAR	
36	11901615037	MITHUN KUMAR	

SL	ROLL	NAME	TOPIC FOR THE TERM PAPER
37	11901615038	PRANOY THAPA	Objectives of clean development mechanism (CDM)
38	11901615039	PRAYAG TAMANG	
39	11901615040	PRITAMBAR MANDAL	
40	11901615041	PROJOY ROY	
41	11901615042	RAJDEEP BARMAN	Methodology for clean development mechanism (CDM)
42	11901615043	RAJDEEP MALAKAR	
43	11901615045	REBATI RAY	
44	11901615046	RIJU MANDAL	
45	11901615047	ROJKA DARNAL	Role of Computer in Energy Management
46	11901615048	SABYASACHI MUKHERJEE	
47	11901615049	SAIKAT SARKAR	
48	11901615050	SAMIR RAJAK	
49	11901615051	SHAHID ANSARI	Economics related to use of solar energy in various fields
50	11901615052	SHUBHAM KUMAR	
51	11901615053	SIBANSU GHOSH	
52	11901615054	SIDDHARTH RAI	
53	11901615055	SNIGDHA CHAKRABORTY	Benchmarking & Energy performance
54	11901615056	SNIGHDHA DAS	
55	11901615057	SOMRAJ ROY	
56	11901615058	SONIA PAUL	
57	11901615059	SOURAV DEBNATH	Energy Audit Instruments
58	11901615060	SOURAV DUTTA	
59	11901615061	SOYEL PERVES	
60	11901615062	SUBAN ROY	
61	11901615063	SUBHAJIT DAS	Energy storing Device
62	11901615064	SUBHAM DAS	
63	11901615065	SUBHAMAY BANIK	
64	11901615066	SUBHOBRATA PANJA	
65	11901615067	SUMAN KUMAR	Working of Maximum Demand controller
66	11901615068	SUSMITA GUHA SARKAR	
67	11901615069	WAQAR AHMED	
68	11901616002	Suman Roy	
69	11901616003	Subham Bhowal	Energy Efficient Transformer
70	11901616004	Srijoy Hore	
71	11901616005	Sourav Datta	
72	11901616006	Sharmistha Karjee	
73	11901616007	Reshma Giri	Energy Efficient Motor
74	11901616008	Rakesh Gurung	
75	11901616009	Nehal Sharma	
76	11901616010	Mainak Biswas	
77	11901616011	Bhaskar Roy	
78	11901616012	Arup Sarkar	

Siliguri Institute of Technology
Course Outcome Attainment
Course Code: EE-801C
Course Name: ENERGY MANAGEMENT & AUDIT

Record of Assessment Carried from different Sheets								
Total No of Students in the Class:			78					
S.No.	Exam	EE801C.1	EE801C.2	EE801C.3	EE801C.4	EE801C.5	Target	Overall Achievement
1	1st Internal Exam	12	30				65%	21
2	2nd Internal Exam	52	34	50	51	11	65%	40
3	Lab							
4	Assignments	56	56	56	56	56	65%	56
5	Quizzes	29	29	29	29	29	65%	29
	Average Internals	37	37	45	45	32	65%	39

Record of Assessment Through Internals					
Course Outcome	Target Course Outcome%	TOTAL STUDENTS	TOTAL STUDENT WHO ATTAINED OUTCOME	% STUDENTS WHO ATTAINED THE OUTCOME	Attainment Level of Each Course Outcome
EE801C.1	65%	78	37	48%	1
EE801C.2	65%	78	37	48%	1
EE801C.3	65%	78	45	58%	1
EE801C.4	65%	78	45	58%	1
EE801C.5	65%	78	32	41%	1
0					
EE503	65%	78	39	50.47%	3

Record of Attainment Level of A Course through University and Internal Assessments

	Target Course Outcome%	TOTAL STUDENTS	TOTAL STUDENT WHO ATTAINED OUTCOME	% STUDENTS WHO ATTAINED THE OUTCOME	Attainment Level
Internal Assessment	65%	78	39	50%	1
Assessment through University Exam	7	78	76	97%	3
Overall Attainment of Course Outcome					2

EE801C.1	Demonstrate knowledge about Energy management and energy auditing approaches (BT 2)
EE801C.2	Explain Energy Scenario. (BT 2)
EE801C.3	Understand the importance of energy conservation and related policies (BT 2)
EE801C.4	Explain reasons for climate change and related protocols & adaptations for sustainable development. (BT 2)
EE801C.5	Discuss about different energy efficient technologies in electrical systems. (BT 3)



Director

Siliguri Institute of Technology