



Subject Title	ENERGY AUDITING & DEMAND SIDE MANAGEMENT		
Subject Code	10EE842	IA Marks	25
Number of Lecture Hrs / Week	04	Exam Marks	100
Total Number of Lecture Hrs	52	Exam Hours	03

FACULTY DETAILS:

Name: Prof. S.D. Hirekodi	Designation: Associate Professor	Experience: 17
No. of times course taught: 01	Specialization: Power Electronics	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Electrical and Electronics Engineering	I/II	Basic Electrical Engineering
02	Electrical and Electronics Engineering	III	Electric Power Generation
03	Electrical and Electronics Engineering	VII	Electrical Power utilization
04	Electrical and Electronics Engineering	V	Transmission and Distribution

2.0 Course Objectives

1. To impart basic knowledge about current energy scenario, energy management, Energy conservation Act, Indian Electricity Act and rules.
2. To introduce the concept of Energy economic analysis
3. To describe energy auditing and routine data collection and monitoring and to indicate their benefits.
4. To impart knowledge about electrical system optimization
5. To impart knowledge about importance of power factor correction and equipments used
6. To introduce the concept of Tariff and impart knowledge about energy saving practices in lighting
7. To introduce the concept of demand-side management and its scope for residential, commercial and industrial energy users.
8. To give an overview of the different types of demand-side measures and provide an overview of the major implementation challenges for DSM programmes

3.0 Course Outcomes

Having successfully completed this course, the student will be able to

	Course Outcome	Bloom's Taxonomy level	POs
CO 418.1	Discuss energy scenario in the world and India.	L1-L4	1,2,3,6,7,8,9, 12
CO 418.2	Explain the need of Energy economic analysis	L1-L4	1,2,3,6,7
CO 418.3	Discuss energy auditing and its outcomes and methodology of detailed energy audit.	L1-L4	1,2,3,6,7,8,9, 10, 12
CO 418.4	Discuss importance of power factor correction, energy efficient motors and electrical tariff	L1-L5	1,2,3,6-12
CO 418.5	Illustrate the various steps in Demand side management planning and implementation.	L1-L4	1,2,3,6,7,8,9, 12
CO 418.6	Discuss Energy conservation opportunities in different sectors.	L1-L4	1,2,3,6,7,8,9, 12
Total Hours of instruction			52



4.0 Course Content

UNIT: 1 **PART - A**
INTRODUCTION: Energy situation – world and India, energy consumption, conservation, Codes, standards and Legislation. **6 Hours**

UNIT: 2
ENERGY ECONOMIC ANALYSIS: The time value of money concept, developing cash flow models, payback analysis, depreciation, taxes and tax credit – numerical problems. **7 Hours**

UNIT: 3
ENERGY AUDITING: Introduction, Elements of energy audits, energy use profiles, measurements in energy audits, presentation of energy audit results. **8 Hours**

UNIT: 4
ELECTRICAL SYSTEM OPTIMIZATION: The power triangle, motor horsepower, power flow concept. **5 Hours**

UNIT - 5 & 6 **PART- B**
ELECTRICAL EQUIPMENT AND POWER FACTOR –correction & location of capacitors, energy efficient motors, lighting basics, electrical tariff, Concept of ABT. **10 Hours**

UNIT - 7 & 8
DEMAND SIDE MANAGEMENT: Introduction to DSM, concept of DSM, benefits of DSM, different techniques of DSM – time of day pricing, multi-utility power exchange model, time of day models for planning, load management, load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment. Management and Organization of Energy Conservation awareness Programs. **16 Hours**

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
NIL	NIL	NIL	NIL

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Energy scenario in the world and India
02	Energy economic analysis
03	Energy auditing and presenting detailed energy audit reports
04	Calculation of power factor correction and improvement techniques
05	Energy conservation opportunities in different sectors
06	Demand side management planning and implementation.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Practical Assignment	Practical assignments will be given to the students to study energy conservation opportunities in different sectors and prepare energy auditing report of lighting and power circuits of installation and work out most economical power factor correction of different loads as a case study.
02	Power point presentation	Related to energy auditing and demand side management



8.0 Books Used and Recommended to Students

Text Books
1. Industrial Energy Management Systems, Arry C. White, Philip S. Schmidt, David R. Brown, Hemisphere Publishing Corporation, New York.
2. Fundamentals of Energy Engineering - Albert Thumann , Prentice Hall Inc, Englewood Cliffs, New Jersey
3. Electrical Power distribution, A S. Pabla, TMH, 5 th edition, 2004
Reference Books
1.Recent Advances in Control and Management of Energy Systems, D.P.Sen, K.R.Padiyar, Indrane Sen, M.A.Pai, Interline Publisher, Bangalore, 1993.
2. Energy Demand – Analysis, Management and Conservation on, Ashok V. Desai , Wiley Eastern, 2005.
3. Demand Side Management by Jyothi Prakash , TMH Publishers.
4.Hand book on energy auditing - TERI (Tata Energy Research Institute)
5. Energy Auditing and Demand Side management by N.G.Ajjanna Gouthami Publications
Additional Study material & e-Books
1. http://pdfstuff4u.com/ebook.php?id=1071881
2. http://sjbit.edu.in

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References
1) www.bee-india.com
2) www.slideshare.net

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	Society of energy engineers and managers	www.energyprofessionals.in
2	Home energy e-newsletter	https://energy.gov/energysaver/energy-saver

11.0 Examination Note

Internal Assessment: 25 Marks

Three internal assessment tests will be conducted. Out of the three tests, average marks of the best two tests marks will be considered. The students will write the internal assessment tests in separate IA test books.

Scheme of Evaluation for Internal Assessment (25 Marks)

Two questions to be set for 12.5 mark each. Student has to answer for both the questions. There will be two sub-questions of 6 and 6.5 marks for each main question. However, there will be an alternate optional question for each sub-question.

Q.No.1 a	6.5M	OR
	6.5M	
b	6M	OR
	6M	
Q.No.2 a	6.5M	OR
	6.5M	
b	6M	OR
	6M	



12.0 Course Delivery Plan

UNIT No.	Lecture No.	Content of Lecture	% of Portion
I	1.	Energy sources	11.53
	2.	World Energy scenario	
	3.	Indian Energy scenario	
	4.	Energy consumption	
	5.	Energy conservation	
	6.	Electrical distribution codes, standards and Legislation	
II	7.	Energy economic analysis- Cost of electrical power generation, –.	13.46
	8.	The time value of money concept	
	9.	Developing cash flow models	
	10.	Payback analysis, Depreciation	
	11.	Taxes and tax credit	
	12.	Numerical problems	
	13.	Numerical problems	
III	14.	Definition, objectives, principles and strategy of Energy management presentation of energy audit results.	15.38%
	15.	Energy audit-Types and Methodology	
	16.	Ten step methodology for detailed energy audit	
	17.	Energy audit activities	
	18.	Energy conservation opportunities and measures	
	19.	Energy audit reporting format	
	20.	Energy use profiles	
	21.	Energy audit instruments	
	22.	Electrical power system	
IV	23.	Power triangle	9.61%
	24.	Motor horsepower	
	25.	Power flow concept.	
	26.	Plant Energy performance	
	27.	Causes and disadvantages of low power, Advantages of high PF	
V& VI	28.	Power factor improvement	19.2
	29.	Calculation of power factor correction	
	30.	Most economical power factor	
	31.	Numerical problems	
	32.	Location of capacitors	
	33.	Energy efficient motors	
	34.	lighting basics	
	35.	electrical tariff	
	36.	Concept of ABT	
	VII& VIII	37.	
38.		Benefits of DSM	
39.		DSM planning and implementation	
40.		Different techniques of DSM: Time of day pricing and metering Multi-utility power exchange model	
41.		time of day models for planning	
42.		Load management as a DSM strategy	
43.		Load priority technique	
44.		peak clipping, peak shifting, Valley filling	
45.		Strategic energy conservation	



46.	End use energy conservation
47.	DSM implementation issues
48.	DSM implementation strategies
49.	Energy efficient equipments: Maximum demand controllers ,APFC,
50.	Energy efficient equipments: Soft starters, VFDs
51.	Energy efficient equipments: Energy efficient transformers, Electronic ballast, occupancy sensors
52.	Management and organization of Energy Conservation awareness Programs.

13.0

QUESTION BANK

PART A

Unit I

1. Explain how energy sources are classified broadly? Give example for each Classification.
2. Discuss the Energy scenario in the world and India.
3. Explain the energy conservation Techniques used to reduce the energy costs.
4. With respect to the supply system summarize the points in the distribution code.
5. Write a note on standards with respect of electrical supply system and electrical equipments.
6. Write a note on objectives of energy conservation act 2001.
7. Which are the issues addressed by energy conservation act 2001?
8. Explain the broad features of an Indian Electricity act 2003.
9. Explain the broad features of Indian Electricity Rules 1956.

Unit II

1. What is the time value of money concept? What are the different cash flow modules?
2. Explain pay back analysis. Mention its advantages and disadvantages.
3. Write short notes on causes of Depreciation and energy audit instruments.
4. What do you understand by depreciation? Explain how depreciation reserve is calculated using: i) Sum of digits method; ii) Straight line Method.
5. Develop a cash flow model for Uniform series compound amount factor.
6. What is meant by life cycle cost analysis? Develop single payment compound amount Cash flow model.

Unit III

1. Define energy audit. Explain the importance of energy audit in industry.
2. Explain in brief the types of energy audit and the outcome of the audit.
3. Explain the various measurements in energy auditing.
4. Write a short note on energy audit instruments.
5. Explain the steps in energy audit report generation.
6. Give the 10 step methodology for detailed energy audit and explain.
7. What is energy use profile? What are the audits required for constructing the energy use profile?
8. Explain the detailed energy audit activities.
9. Explain the different steps of presenting energy audit results.

Unit IV

1. With a vector diagram, explain the various components of power triangle.
2. With a relevant diagram explain power flow from Generating station to consumers.
3. Draw the single line diagram for a typical A.C. Power supply scheme and explain.
4. What is plant energy performance (PEP)? Define the production factor.

PART B



Unit V&VI

1. Define power factor mention the causes of low power factor.
2. What are the limitations of low power factor? Explain in brief.
3. Explain the Advantages of high power factor.
4. Explain the calculation of power factor correction.
5. Derive an Expression for most economical power factor considering constant active power. Draw relevant vector diagram.
6. What is Tariff? Explain different types of Tariff commonly Used.
7. What is ABT? What are the broad features of ABT design?
8. Give the comparison between existing tariff and availability based tariff.
9. Write a note on Energy Efficient Motors.
10. What are the options available to meet the increased Demand on power station? Justify its installation.
11. Write a note on energy saving practices in street lighting.
12. List some good practices in lighting explain in brief.

Unit VII&VIII

1. What is demand side management (DSM)? What is the scope of DSM? How did the concept of DSM evolve?
2. Explain the various steps in DSM planning and implementation.
3. Explain peak clipping, valley filling and strategic energy conservation.
4. Discuss tariff options for DSM. Which tariffs promote DSM?
5. Explain the management and organization of energy conservation awareness programmes.
6. With a flow Diagram explain DSM planning and implementation.
7. Explain various DSM strategies from load curve objectives view. Mention benefits of the strategies.
8. Explain energy conservation opportunities in Agriculture sector.
9. Explain energy conservation opportunities in illumination system.
10. Explain plant level organization with relevant diagram.
11. Explain Load management as a DSM Strategy.
12. Explain the basic ways of Load shape objectives of DSM.
13. With a flow chart, explain corporate level organization of Energy conservation Programme.
14. What is time of -day pricing? With the help of suitable Example, explain how this helps in an efficient DSM.

14.0 University Result

Examination	FCD	FC	SC	% Passing
July 2017	07	05	16	100

Prepared by	Checked by		
Prof. S.D.Hirekodi	Prof.S.B.Patil	HOD	Principal

USN

--	--	--	--	--	--	--	--	--	--

10EE842

Eighth Semester B.E. Degree Examination, June/July 2017

Energy Auditing and D.S.M

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Explain how energy sources are classified broadly. Give examples for each classification. (06 Marks)
b. Write a brief note on "energy scenario in India". (08 Marks)
c. List the objectives of energy conservation act 2001. (06 Marks)
- 2 a. What do you mean by i) cash flow model ii) depreciation. (06 Marks)
b. Develop a cash flow model for uniform series compound amount factor. (06 Marks)
c. Calculate the depreciation for data give below, salvage value $Rs = 0$, life of the equipment = 5 years, initial expenditure $P = Rs 1,50,000/-$. For declining balance use a 200% rate, by using i) straight line method ii) sum of years digit method iii) Decline balance method. (08 Marks)
- 3 a. What is an energy audit? Explain data acquisition and data analysis with respect to energy audit. (06 Marks)
b. Give the ten methodology steps for detailed energy audit and explain each one in brief. (10 Marks)
c. Write a short note on "energy use profile". (04 Marks)
- 4 a. Explain the typical A.C power supply scheme with suitable line diagram. (08 Marks)
b. Write a short note on "energy audit report". (06 Marks)
c. A single phase motor is connected to 400V, 50Hz AC supply takes a 20A at a power factor of 0.7 lagging. Calculate the capacitance required in parallel with the motor to raise the power factor to 0.9 lagging. (06 Marks)

PART – B

- 5 a. Using the power distribution diagram discuss the location of capacitors in a plant to reduce the energy consumption. (06 Marks)
b. What do you mean by Energy efficient motor (EEM), briefly discuss the design features of EEM. (06 Marks)
c. What is ABT? Discuss the broad features of ABT design. (08 Marks)
- 6 a. Briefly discuss the lighting control systems are used at design stage. (08 Marks)
b. Explain the following Indian tariffs
i) Three part tariff ii) Power factor tariff iii) KVA maximum demand tariff. (06 Marks)
c. Write a note on energy efficient lamps i) CFL ii) HPSV iii) TLD. (06 Marks)
- 7 a. What is demand side management? Mention the benefits of DSM. (06 Marks)
b. Explain: i) peak clipping ii) valley filling. (08 Marks)
c. Discuss the energy conservation opportunities in
i) Agriculture sector ii) Illumination system. (06 Marks)
- 8 a. Briefly discuss various DSM based tariffs. (08 Marks)
b. Write a note on DSM implementation issues. (06 Marks)
c. Explain the plant level energy conservation program with flow chart. (06 Marks)

USN

For More Question Papers Visit - www.pediawikiblog.com 10PE342

Eighth Semester B.E. Degree Examination, June/July 2016
Energy Audit and Demand Side Management

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Explain the energy conservation techniques used to reduce the energy costs. (06 Marks)
- b. With respect to supply system summarise the points in the distribution code. (03 Marks)
- c. Explain broad features of Indian electricity rules 1956. (06 Marks)
- 2 a. Explain payback analysis. Mention its advantages and disadvantages. (06 Marks)
- b. What is life cycle cost analysis? What are typical costs for a system and different ways to minimize costs? (06 Marks)
- c. The equipment in a power station costs Rs. 15, 60,000/- and has salvage value of Rs. 60,000/- at the end of 25 years. Determine the depreciation value of the equipment at the end of 20 years by the following methods (i) straight line method (ii) Reducing balance method (iii) sinking fund method at 5% compounded annually. (08 Marks)
- 3 a. What are the energy management strategies? Explain them in brief. (08 Marks)
- b. What are energy audit instruments? Explain each one of them. (12 Marks)
- 4 a. With a vector diagram, explain various components of power triangle. (06 Marks)
- b. What is power flow concept? Define and explain plant energy performance and production factor. (06 Marks)
- c. Write short notes on : (08 Marks)
- (i) Primary and secondary distribution (ii) Advantages of energy audit.

PART - B

- 5 a. Define power factor. What are the causes and disadvantages of low power factor? (12 Marks)
- b. Derive an expression for the most economical power factor. (08 Marks)
- 6 a. Write a note on energy efficient motors. (10 Marks)
- b. An industrial load operates at 0.75 p.f lag and has a monthly demand of 750kVA. The monthly power rate is Rs. 8.50 per kVA. To improve the power factor 200kVAR capacitors are installed in which there is negligible power loss. The installed cost of equipment is Rs. 20,000/- and fixed charges are estimated at 10% per year. Calculate the annual savings effected by the use of capacitors. (10 Marks)
- 7 a. Define and explain the concept of DSM. (06 Marks)
- b. What are the different benefits of DSM for supply industry, customers and society? (06 Marks)
- c. Briefly explain the DSM implementation issues. (08 Marks)
- 8 a. Explain energy conservation opportunities in agricultural sector, industrial sector and illumination system. (08 Marks)
- b. Discuss tariff options for DSM. Which tariffs promote DSM? (06 Marks)
- c. Explain: (i) Peak clipping (ii) valley filling (iii) Strategic energy conservation. (06 Marks)

For More Question Papers Visit - www.pediawikiblog.com

USN

--	--	--	--	--	--	--	--	--	--

10EE842

Eighth Semester B.E. Degree Examination, June/July 2015
Energy Auditing and Demand Side Management

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. Describe the present energy situation in India. (10 Marks)
b. Write a short note on standards, with respect to equipments of electrical engineering. (06 Marks)
c. What is Energy conservation? Explain. (04 Marks)
- 2 a. Develop cash flow model for single payment compound amount. (10 Marks)
b. In a Milk Industry, the existing low cost conventional 5Hp-motor is to be replaced with energy motor after 10 years. Assume that Rs 10,000 is to be provided after 10 years. Find the total fund during the course of 10 years by straight line depreciation method and sinking fund depreciation method. Plot the graph of total fund verses time in years for both the methods. Assume rate of interest 5% for sinking fund depreciation method. (10 Marks)
- 3 a. Explain the various classification of energy audit. (10 Marks)
b. Discuss the role of energy management team. (10 Marks)
- 4 Write short notes on :
a. Time value of money concept.
b. Layout of Typical ac power supply scheme.
c. Distribution scheme.
d. Advantages of energy audit. (20 Marks)

PART - B

- 5 a. Define Power factor and derive expression for most economical power factor. Discuss the importance of power factor improvement, from supplier and consumer point of view. (10 Marks)
b. A factory has a maximum load of 240 KW at 0.7 lagging with an annual consumption of 50,000 units. The tariff is Rs 50/KVA of maximum demand plus 10 paise/unit. Calculate the flat rate of energy consumption. What will be annual saving if PF is raised to unity? (10 Marks)
- 6 a. What is Tariff? What are the different types of tariff? Explain. (10 Marks)
b. What is ABT? What are the broad features of ABT design? (10 Marks)
- 7 a. What is DSM? What is the scope of DSM? How did the concept of DSM evolved? (10 Marks)
b. With a flow chart, explain the various steps in DSM planning and implementation. (10 Marks)
- 8 a. Discuss the tariff options for DSM. Which tariff promote DSM? (10 Marks)
b. Explain the following terms :
i) Peak clipping ii) Valley filling. (10 Marks)

Eighth Semester B.E. Degree Examination, June/July 2014
Energy Audit and Demand Side Management

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, selecting
atleast TWO questions from each part.
2. Missing data may be suitably assumed.**

PART – A

- 1 a. Write a short note on standards with respect of electrical equipments. (08 Marks)
- b. Explain the broad features of Indian electricity rule 1956. (08 Marks)
- c. What is energy conservation? Explain. (04 Marks)
- 2 a. Explain pay back analysis. Mention its advantages and disadvantages. (05 Marks)
- b. A plant cost Rs. 7.56×10^5 and it is estimated that after 25 years it will have to be replaced by a new one, at that instant its salvage value will be Rs. 1.56×10^5 . Calculate: i) Annual deposit to be made in order to replace the plant after 25 years; ii) The value of the plant after 10 years on the following basis:
 - i) Straight line depreciation method. (05 Marks)
 - ii) Reducing balance method. (10 Marks)
 - iii) Sinking fund depreciation method at 8% annual compound interest. (10 Marks)
- c. Explain cash flow model. (10 Marks)
- 3 a. Write short note on energy audit instruments. (10 Marks)
- b. Explain detailed energy audit. (10 Marks)
- 4 a. With a vector diagram, explain the various component of powertriangle. (08 Marks)
- b. Explain plant energy performance (PEP) and power flow concept. (08 Marks)
- c. Write short notes on primary and secondary distribution. (04 Marks)

PART – B

- 5 a. What are the limitations of low power factor? Explain in brief. (08 Marks)
- b. Define tariff. List the characteristics of tariff. (06 Marks)
- c. The monthly readings of a consumer's meter are as follows:
Maximum demand: 50 kWh, energy consumed = 36,000 kWh, reactive energy 23,400 KVAR. If the tariff is Rs.100/kW of maximum demand plus 6 paise/unit plus 0.5 paise/unit for each 1% of power factor below 86%, calculate the monthly bill of consumer. (06 Marks)
- 6 a. What is ABT? What are the broad features of ABT design? (10 Marks)
- b. An industrial load takes 1,00,000 units in a year, the average power factor being 0.8 lagging. The recorded maximum demand is 500KVA. The tariff is Rs.120 KVA of maximum demand plus 2.5 paise/kWh. Calculate the annual cost of supply and find out the annual saving in cost by installing phase advancing plant costing Rs.50/KVAR, which raises the p.f. from 0.8 to 0.95 lagging. Allow 10% per year on the cost of phase advancing plant to cover all additional costs. (10 Marks)
- 7 a. Explain energy efficient technology in electrical system. (10 Marks)
- b. Briefly explain the DSM planning and implementation. (10 Marks)
- 8 a. Explain energy conservation opportunities in illumination and industrial sector. (10 Marks)
- b. Write short notes on: i) Peak clipping; ii) Load shifting; iii) Valley filling. (10 Marks)

For More Question Papers Visit - www.pediawikiblog.com

Eighth Semester B.E. Degree Examination, June/July 2014
Energy Audit and Demand Side Management

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, selecting
at least TWO questions from each part.
2. Missing data may be suitably assumed.**

PART – A

1.
 - a. Write a short note on standards with respect of electrical equipments. (08 Marks)
 - b. Explain the broad features of Indian electricity rule 1956 (08 Marks)
 - c. What is energy conservation? Explain. (04 Marks)
2.
 - a. Explain pay back analysis. Mention its advantages and disadvantages. (05 Marks)
 - b. A plant cost Rs. 7.56×10^5 and it is estimated that after 25 years it will have to be replaced by a new one, at that instant its salvage value will be Rs. 1.56×10^5 . Calculate: i) Annual deposit to be made in order to replace the plant after 25 years; ii) The value of the plant after 10 years on the following basis:
 - i) Straight line depreciation method. (05 Marks)
 - ii) Reducing balance method.
 - iii) Sinking fund depreciation method at 8% annual compound interest. (05 Marks)
 - c. Explain cash flow model. (10 Marks)
3.
 - a. Write short note on energy audit instruments. (10 Marks)
 - b. Explain detailed energy audit. (10 Marks)
4.
 - a. With a vector diagram, explain the various component of power triangle. (08 Marks)
 - b. Explain plant energy performance (PEP) and power factor concept. (08 Marks)
 - c. Write short notes on primary and secondary distribution. (04 Marks)

PART – B

5.
 - a. What are the limitations of low power factor? Explain in brief. (08 Marks)
 - b. Define tariff. List the characteristics of tariff. (06 Marks)
 - c. The monthly readings of a consumer's meter are as follows:
Maximum demand, 50 kWh, energy consumed = 36,000 kWh, reactive energy 28,400 KVAR. If the tariff is Rs.100/kWh of maximum demand plus 6 paise unit plus 0.5 paise unit for each 1% of power factor below 86%, calculate the monthly bill of consumer. (06 Marks)
6.
 - a. What is ABT? What are the broad features of ABT design? (10 Marks)
 - b. An industrial load takes 1,00,000 units in a year, the average power factor being 0.8 lagging. The recorded maximum demand is 500KVA. The tariff is Rs.120/KVA of maximum demand plus 2.5 paise/kWh. Calculate the annual cost of supply and find out the annual saving in cost by installing phase advancing plant costing Rs.50/KVAR, which raises the p.f. from 0.8 to 0.95 lagging. Allow 10% per year on the cost of phase advancing plant to cover all additional costs. (10 Marks)
7.
 - a. Explain energy efficient technology in electrical system. (10 Marks)
 - b. Briefly explain the DSM planning and implementation. (10 Marks)
8.
 - a. Explain energy conservation opportunities in illumination and industrial sector. (10 Marks)
 - b. Write short notes on: i) Peak clipping; ii) Load shifting; iii) Valley filling. (10 Marks)
