

<p>Academic Course Description BHARATH UNIVERSITY Faculty of Engineering and Technology Department of Mechanical Engineering BA005 - ENERGY ENGINEERING AND MANAGEMENT Eight Semester, 2015-16 (Even Semester)</p>
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Course (catalog) description

To enlighten the student in the field of energy engineering concern with energy efficiency, energy service and facility management.

Compulsory/Elective course : Elective for Mechanical students

Credit & contact hours : 3 & 45

Course Coordinator : Ms.Pavithra

Instructors : Karthikeyan S

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Karthikeyan S	VIII Sem	JR106		karthikeyans.mech@bharathuniv.ac.in	Thursday 12.30 to 01.30

Relationship to other courses:

Pre –requisites : Nil

Assumed knowledge : Calculating Energy Efficiency, Audit & Service.

Following courses : Nil

Syllabus Contents

UNIT I INTRODUCTION TO ENERGY AND ENVIRONMENT 9

Hours

Definition – Fossil fuel reserves – Energy consumption – Green house effect, global warming – Renewable energy resources – Environmental aspects, utilization – energy prizes – Energy policies.

UNIT II ENERGY CONSERVATION 9 Hours

Need – different types of energy conservation schemes – industrial energy use – energy surveying and auditing – energy index – cost of energy – cost index-energy conservation in engineering and process industry in thermal systems, in buildings and non conventional energy resources schemes.

UNIT III ENERGY GENERATION BY TECHNOLOGY 9

Hours

Fuels and consumption – Boilers – Furnaces – Waste heat recovery systems – Heat pumps and refrigerators – Storage systems – Insulated pipe work systems – heat exchangers.

UNIT IV ENERGY MANAGEMENT

9 Hours

Energy management principles – energy resource management – energy management. information systems – Instrumentation and measurement – Computerized energy management

UNIT V ENGINEERING ECONOMICS

9 Hours

Costing techniques – Optimization cost – Optimal target investment schedules – Finance appraisal – Profitability – Project management.

Total : 45 Hours

TEXTBOOKS:

Amlan Chakrabarthy., Energy Engineering and Management.,PHI.,2011.

REFERENCES:

1. W.R. Murphy and G. Mckay, Energy Management, Butterworths, London, 1982.
2. Callaghan P.W. Design and Management for Energy Conservation, Pergamon Press, Oxford,1993.

https://books.google.com/books/.../Energy_Engineering_and_Managem...

Computer usage:

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100 %

Broad area: Conventional Energy

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 2 nd week	Session 1 to 14	2 Periods
2	Cycle Test-2	March 2 nd week	Session 15 to 28	2 Periods
3	Model Test	April 3 rd week	Session 1 to 45	3 Hrs
4 1	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

Learning about alternate energy and its potential for the future generation.	Correlates to program outcome		
	H	M	L
1. Understand different energy resources and their uses.	C		
2. Understand different energy conservation techniques.	E	H	I
3. Understand the impact energy on environment	F		I
4. Understand the different types of energy conservation schemes		G	I,L
5. Understand Insulated pipe work systems		F,H	L
6. Understand Optimal target investment schedules			

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

Session	Topics	Problem Solving (Yes/No)	Text/Chapter
UNIT I : INTRODUCTION TO ENERGY AND ENVIRONMENT			
1	Introduction	No	[T1], [R1]
2	Fossil fuel reserves	No	
3	Energy consumption	No	
4	Green house effect, global warming	No	
5	Renewable energy resources	No	
6	Environmental aspects, utilization	No	
7	Energy prizes	No	
8	Energy policies	No	
9	Summary of Unit I	No	
UNIT II : ENERGY CONSERVATION			
10	Need for energy conservation	No	[T1],[R2]
11	Different types of energy conservation schemes	No	
12	Industrial energy use	No	
13	Energy surveying and auditing	Yes	
14	Energy index – cost of energy	Yes	
15	Cost index, energy conservation in engineering	No	
16	Energy conservation in process industry in thermal systems	No	
17	Energy conservation in buildings	Yes	
18	Non conventional energy resources schemes	No	
UNIT III : ENERGY GENERATION BY TECHNOLOGY			

19	Fuels and consumption	No	[T1]
20	Boilers	No	
21	Furnaces	No	
22	Waste heat recovery systems	Yes	
23	Heat pumps and refrigerators	No	
24	Storage systems	No	
25	Insulated pipe work systems	No	
26	Heat exchangers	Yes	
27	Summary	No	
UNIT IV : ENERGY MANAGEMENT			
28	Need for energy management	No	[T1],[R2]
29	Energy management principles	No	
30	Energy resource management	No	
31	Energy management	Yes	
32	Information systems	No	
33	Instrumentation and measurement	No	
34	Computerized energy management	No	
35	Energy systems	No	
36	Recap on energy management	No	
UNIT V : ENGINEERING ECONOMICS			
37	Economics introduction	No	[T1]
38	Costing techniques	No	
39	Need for optimization	No	
40	Optimization cost	No	
41	Optimal target investment schedules	No	
42	Finance appraisal	No	
43	Profitability	No	
44	Project management	No	
45	Summary of Energy engineering	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignment / Seminar / Online Test / Quiz	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by Karthikeyan S

Addendum

ABET Outcomes expected of graduates of B.Tech / MECH / program by the time that they graduate:

- a) The ability to apply knowledge of mathematics, science, and engineering fundamentals.
- b) The ability to identify, formulate and solve engineering problems.
- c) The ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- d) The ability to design and conduct experiments, as well as to analyze and interpret data
- e) The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- f) The ability to apply reasoning informed by the knowledge of contemporary issues.
- g) The ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- h) The ability to understand professional and ethical responsibility and apply them in engineering practices.
- i) The ability to function on multidisciplinary teams.
- j) The ability to communicate effectively with the engineering community and with society at large.
- k) The ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.
- l) The ability to recognize the need for, and an ability to engage in life-long learning.

Program Educational Objectives

PEO1: PREPARATION:

Mechanical Engineering graduates are enthusiastic to provide strong foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve engineering problems in the field of Mechanical Engineering.

PEO2: CORE COMPETENCE:

Mechanical Engineering graduates have competence to enhance the skills and experience in defining problems in the field of Mechanical Engineering and Technology design and implement, analyzing the experimental evaluations, and finally making appropriate decisions.

PEO3: PROFESSIONALISM:

Mechanical Engineering graduates made competence to enhance their skills and embrace new thrust areas through self-directed professional development and post-graduate training or education.

PEO4: PROFICIENCY:

Mechanical Engineering graduates became skilled to afford training for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS:

Mechanical Engineering graduates are morally merged to apply the ethical and social aspects of modern Engineering and Technology innovations to the design, development, and usage of new products, machines, gadgets, devices, etc.

BBA005 - ENERGY ENGINEERING AND MANAGEMENT

Course Teacher Karthikeyan S	Signature
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Course Coordinator
Ms.Pavithra

HOD/MECH