

**Academic Course Description**

<p>BHARATH UNIVERSITY                  Faculty of Engineering and Technology                  Department of Mechanical Engineering                  BGE003 – NEW AND RENEWABLE SOURCES OF ENERGY                  Sixth Semester – 2015 – 2016 – Even Semester</p>
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**Course (catalog) description :**

- the students can able to identify the new methodologies / technologies for effective utilization of renewable energy sources.
- Enhance knowledge on solar and wind energy.
- Get aware about different source of renewable energy.
- Learn various sources of energy
- Will gain knowledge on energy management
- Will understand the importance of saving fuels

**Compulsory/Elective course : Compulsory**

Credit hours : 3 & 45

Course Coordinator : Mr.Golden Renjith Nimal

**Instructors : Mr.Thirumavalavan**

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Mr.Thirumavalavan	IV year – C Sec	Sk-003		Thirumavalavan.mech@bharathuniv.ac.in	9.00 – 9.50am

**Relationship to other courses:**

Pre –requisites : Basic Mechanical Engineering

Assumed knowledge :

- Get aware about different source of renewable energy.
- Learn various sources of energy

Following courses :

## Syllabus Contents

### UNIT I WIND ENERGY

9

Introduction-Location of Wind Generators-Types of Windmills-Induction and Synchronous Systems

### UNIT II SOLAR ENERGY

9

Principle of Conversion of Solar Radiation into Heat, Types of Solar Thermal Collectors- Flat Plate And Concentrating Collectors(Parabolic, Trough, Minor Strip, Fresnel Lens and Compound Parabolic Concentrator), Comparison of Collectors, Selective Absorber Coatings, Solar Thermal Power Plant

### UNIT III SOLAR ENERGY STORAGE AND APPLICATION

9

Solar energy storage systems- thermal, electrical, chemical, mechanical and electromagnetic, solar pond. Application of solar energy- solar thermoelectric conversion- solar photo voltaics, solar heating and cooling of buildings, solar distillation, solar pumping and solar cookers. System of solar cell power plant- direct grid connection through electronic control devices

### UNIT IV BIO- MASS

9

Sources Of Bio-Mass Energy- Wood And Agricultural Waste- Municipal Waste- Animal Waste- Energy Conservation Systems- Biogas Generation From Animal Waste- Wood Gasification-Downdraft And Fluidized Bed Systems- Alcohol Fuels

### UNIT V OTHERSOURCES

9

Wave Energy- Scope and Simple Systems for Power Generation, Tidal Power- Scope and Applications, Otec-Scope, Fundamental Principles and Operating System for Power Generation

**Total : 45 Hours**

## TEXTBOOK:

1. Rai,G.D. Non – Conventional Sources of Energy, Khanna publications, 4th edition 2004
2. Le Gouries.D, Wind Power Plants, Theory and Design –permagon press,1982.

## REFERENCES:

- 1.David M.Eggleston and Forrest S.Stoddard,Wind Turbine Engineering Designing- Van Noustrand 1987
- 2.F.S.seiler, Alternate Energy Vehicle Information, Wind Book Inc.,1977
3. Barbara Keiler, Energy Alternatives,Luscentr Books,1990
4. T.Nejat Veziroygal, Alternative Energy Sources-III,Hemisphre Publishing co.,1989.
5. [www.studynama.com/.../357-Renewable-energy-sources-ebook-pdf-lect..](http://www.studynama.com/.../357-Renewable-energy-sources-ebook-pdf-lect..)

**Computer usage: yes**

## Professional component

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

**Broad area : Mechanical**

## Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	Feb 2 <sup>st</sup> week	Session 1 to 15	2 Periods
2	Cycle Test-2	March 2 <sup>nd</sup> week	Session 16 to 30	2 Periods
3	Model Test	Aprilr 2 <sup>nd</sup> week	Session 1 to 45	3 Hrs
4	University Examination		All sessions / Units	3 Hrs.

## Mapping of Instructional Objectives with Program Outcome

Familiarize the students with the Basics and fundamental concepts of Mechanical Vibration and to highlight the approaches in organization behavior	Correlates to program outcome		
	H	M	L
The students can able to identify the new methodologies / technologies for effective utilization of renewable energy sources.			a
Enhance knowledge on solar and wind energy.	G,j,k,l		a
Get aware about different solar energy storage	G,j,k,l	c.d	a,h
Learn about biomass	j,k,l	d	h
Will gain knowledge on sources of energy	G,j,k,l	d	
Will understand power generation	G,j,k,l		

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

**Draft Lecture Schedule**

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
<b>UNIT I WIND ENERGY</b>			
1.	Introduction	NO	UNIT 1 T1,R1 & R2
2.	Location of Wind Generators	NO	
3.	Types of Windmills	NO	
4.	Applications of Windmills	NO	
5.	Advantages of Windmills	NO	
6.	Induction Systems	NO	
7.	Synchronous Systems	NO	
8.	Applications Induction and Synchronous Systems	NO	
9.	Advantages Induction and Synchronous Systems	NO	
<b>UNIT II SOLAR ENERGY</b>			
10.	Principle of Conversion of Solar Radiation into Heat	NO	UNIT 2 T2,R1 & R2
11.	Types of Solar Thermal Collectors	NO	
12.	Flat Plate And Concentrating Collectors	NO	
13.	Parabolic, Trough, Minor Strip, Fresnel Lens	NO	
14.	Compound Parabolic Concentrator	NO	
15.	Comparison of Collectors	NO	
16.	Selective Absorber Coatings	NO	
17.	Solar Thermal Power Plant	NO	
18.	Applications & advantages	NO	
<b>UNIT III SOLAR ENERGY STORAGE AND APPLICATION</b>			
19.	Solar energy storage systems	NO	UNIT 3 T1,R1 & R2
20.	thermal, electrical, chemical, mechanical and electromagnetic	NO	
21.	solar pond	NO	
22.	Application of solar energy- solar thermoelectric conversion	NO	
23.	solar photo voltaics	NO	
24.	solar heating and cooling of buildings, solar distillation	NO	
25.	solar pumping and solar cookers	NO	
26.	System of solar cell power plant	NO	
27.	direct grid connection through electronic control devices	NO	
<b>UNIT IV BIO- MASS</b>			
28.	Sources Of Bio-Mass Energy	NO	UNIT 4 T1,R1 & R2
29.	Wood And Agricultural Waste	NO	
30.	Municipal Waste	NO	
31.	Animal Waste	NO	

32.	Energy Conservation Systems	NO	
33.	Biogas Generation From Animal Waste	NO	
34.	Wood Gasification	NO	
35.	Downdraft And Fluidized Bed Systems	NO	
36.	Alcohol Fuels	NO	

#### UNIT V OTHERSOURCES

37.	Wave Energy	NO	UNIT 5 T1,R1 & R2
38.	Scope and Simple Systems for Power Generation	NO	
39.	Tidal Power	NO	
40.	Scope and Applications	NO	
41.	Otec-Scope	NO	
42.	Fundamental Principles	NO	
43.	Operating System for Power Generation	NO	
44.	Applications	NO	
45.	Advantages	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	-	10%
Cycle Test – II	-	10%
Model Test	-	25%
Attendance	-	5%
Final exam	-	50%

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Prepared by : Mr.A.SARAVANA KUMAR

Dated :

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.

<b>Course Teacher</b> Mr.Thirumavalavan	<b>Signature</b>
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**Course Coordinator**  
Mr.Golden Renjith Nimal

**HOD/MECH**