

Academic Course Description

BHARATH UNIVERSITY
 Faculty of Engineering and Technology
 Department of Electronics and Communication Engineering
BME203 - BASIC MECHANICAL ENGINEERING

Course (catalog) description

To make the students understand about energy resources and power generation, IC engines, refrigeration and air-conditioning system, manufacturing processes, mechanical design.

Compulsory/Elective course : Compulsory

Credit & contact hours : 3&30
 Course Coordinator : Mr Karthik

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Mr Karthik	First Year Building	First Year Building	-		1:00 p.m – 1:30 p.m

Relationship to other courses

Pre –requisites : +2 Maths & Physical Science

Assumed knowledge : Understanding about energy resources and power generation, IC engines, refrigeration and air-conditioning system, manufacturing processes, mechanical design.

Following courses : -

Syllabus Contents

UNIT I ENERGY RESOURCES AND POWER GENERATION

6

Renewable and Non-renewable resources- solar, wind, geothermal, steam, nuclear and hydro power plants Layout, major components and working. Importance of Energy storage, Environmental constraints of power generation using fossil fuels and nuclear energy.

UNIT II IC ENGINES

6

Classification, working principles of petrol and diesel engines- two stroke and four stroke cycles, functions of main components of I.C engine. Alternate fuels and emission control.

UNIT III REFRIGERATION AND AIR-CONDITIONINGSYSTEM

6

Terminology of Refrigeration and Air-Conditioning, Principle of Vapor Compression & Absorption system- Layout of typical domestic refrigerator- window & Split type room air conditioner.

UNIT IV MANUFACTURING PROCESSES

6

description of Mould makes and casting process, Metal forming, Classification types of forging, forging operations, Brief description of extrusion, rolling, sheet forging, and drawing. Brief description of welding, brazing and soldering. Principal metal cutting processes and cutting tools, Brief description of Centre lathe and radial drilling machine.

UNIT V MECHANICAL DESIGN

6

Mechanical properties of material-Yield strength, ultimate strength, endurance limit etc., Stress-Strain curves of materials. Stresses induced in simple elements. Factor of safety - Design of Shafts and belts. Types of bearings and its applications. Introduction to CAD/CAM/CIM & Mechatronics

Total : 30 hr**TEXTBOOKS:**

1. T.J.Prabhuetal, "Basic Mechanical Engineering", SciTech Publications(p)Ltd,2000

REFERENCES:

1. NAGPAL,G.R, "PowerplantEngineering",KhannaPublishers,2004.
2. RAO.P.N, "ManufacturingTechnology",TataMcGraw-HillEducation,2000.
3. Kalpakjian, "ManufacturingEngineeringandTechnology",AdissoWesleypublishers,1995.
4. Ganesan.V, "Internalcombustionengines",TataMcGraw-HillEducation,2000.
5. C.P.Arora, "Refrigeration and Air Conditioning",TataMcGraw-HillEducation,2001.
6. V.B.Bhandari, "Design of Machine elements", Tata McGraw-HillEducation,2010.

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	February 2 nd week	Session 1 to 10	2 Periods
2	Cycle Test-2	March 2 nd week	Session 11 to 20	2 Periods
3	Model Test	April last week	Session 1 to 30	3 Hrs

4	University Examination	TBA	All sessions / Units	3 Hrs.
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Mapping of Instructional Objectives with Program Outcome

Familiarize the students with the Basics and fundamental concepts of Engineering and to highlight the approaches in organization behavior	Correlates to program outcome		
	H	M	L
1. An ability to apply knowledge of mathematics	d	a,b,c,e,g	j,k
2. An ability to apply knowledge of science, and engineering	a,d,e	b,c,g	j,k
3. Ability to design and conduct experiments, as well as to analyze and interpret data.	a,d,e	b,c,g	j,k
4. An ability to function on multi-disciplinary teams	a,d	b,c,g	j,k
5. To provide basic Knowledge of basic manufacturing process.	a,d	b,c,g	j,k
6. Ability to identify, formulate, and solve engineering problems	a,d	b,g	j,k

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

Draft Lecture Schedule

Session	Topics	Problem Solving (Yes/No)	Text / Chapter
UNIT I ENERGY RESOURCES AND POWER GENERATION			
1.	Renewable and Non-renewable resources- solar power plants Layout	No	Unit I T1/R1
2.	Wind, geothermal, steam power plants Layout	No	
3.	Nuclear and hydro power plants Layout	No	
4.	Major components and working of Power plant	No	
5.	Environmental constraints of power generation using fossil fuels	No	
6.	Nuclear energy.	No	
UNIT II IC ENGINES			
7.	Classification of I.C Engines	No	Unit II T1/R4
8.	Working principles of Petrol Engines	No	
9.	Working principles of Diesel Engines	No	
10.	Two stroke and four stroke cycles	No	
11.	Functions of main components of I.C engine	No	

12.	Alternate fuels and emission control	No	
UNIT III REFRIGERATION AND AIR-CONDITIONING SYSTEM			
13.	Terminology of Refrigeration and Air-Conditioning	No	Unit III T1/R5
14.	Principle of Vapor Compression Refrigeration system	No	
15.	Principle of Vapor Absorption Refrigeration system	No	
16.	Layout of typical domestic refrigerator	No	
17.	Layout of window type room air conditioner	No	
18.	Layout of Split type room air conditioner	No	
UNIT IV MANUFACTURING PROCESSES			
19.	description of Mould makes and casting process	No	Unit III T1/R5
20.	Metal forming, Classification types of forging, forging operations	No	
21.	Brief description of extrusion, rolling, sheet forging, and drawing	No	
22.	Brief description of welding, brazing and soldering	No	
23.	Principal metal cutting processes and cutting tools	No	
24.	Brief description of Centre lathe and radial drilling machine.	No	
UNIT V MECHANICAL DESIGN			
25.	Mechanical properties of material-Yield strength, ultimate strength, endurance limit etc	No	Unit III T1/R5
26.	Stress-Strain curves of materials	No	
27.	Stresses induced in simple elements, Factor of safety	No	
28.	Design of Shafts and belts	Yes	
29.	Types of bearings and its applications	No	
30.	Introduction to CAD/CAM/CIM & Mechatronics		

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%
Assignments/Seminar/online test/quiz	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by : Mr Karthik

Dated :

Addendum

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

- a) An ability to apply knowledge of mathematics, science, and engineering
- b) An ability to design and conduct experiments, as well as to analyze and interpret data
- c) An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d) An ability to function on multidisciplinary teams
- e) An ability to identify, formulate, and solve engineering problems
- f) An understanding of professional and ethical responsibility
- g) An ability to communicate effectively
- h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i) A recognition of the need for, and an ability to engage in life-long learning
- j) A knowledge of contemporary issues
- k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

PEO1: PREPARATION

Electronics Engineering graduates are provided with a strong foundation to passionately apply the fundamental principles of mathematics, science, and engineering knowledge to solve technical problems and also to combine fundamental knowledge of engineering principles with modern techniques to solve realistic, unstructured problems that arise in the field of Engineering and non-engineering efficiently and cost effectively.

PEO2: CORE COMPETENCE

Electronics engineering graduates have proficiency to enhance the skills and experience to apply their engineering knowledge, critical thinking and problem solving abilities in professional engineering practice for a wide variety of technical applications, including the design and usage of modern tools for improvement in the field of Electronics and Communication Engineering.

PEO3: PROFESSIONALISM Electronics Engineering Graduates will be expected to pursue life-long learning by successfully participating in post graduate or any other professional program for continuous improvement which is a requisite for a successful engineer to become a leader in the work force or educational sector.

PEO4: SKILL

Electronics Engineering Graduates will become skilled in soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, interpersonal relationship, group discussion and leadership ability to become a better professional.

PEO5: ETHICS

Electronics Engineering Graduates are morally boosted to make decisions that are ethical, safe and environmentally-responsible and also to innovate continuously for societal improvement.

Course Teacher	Signature
Mr.Karthik	

Course Coordinator

HOD/ECE

