

Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Civil Engineering
BME202 – ENGINEERING MECHANICS
First Semester, 2015-16 (odd Semester)

First Semester, 2015-16 (odd Semester)

Course (catalog) description

To understand the concept of basic engineering mechanism.

Compulsory/Elective course : compulsory

Credit & Contact hours : 3 & 60 hours

Course Coordinator : Mrs. Meenakshi

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
S Ramalingam	First Year				
Jeswin arputhabalan	First Year				
Saravanakumar	First Year				
Sathish Kumar	First Year				
Thirupathiraj	First Year				
Mrs.Meenakshi	First Year				

Relationship to other courses:

Pre –requisites : Engineering Mathematics I, II, Engineering Physics

Assumed knowledge : To understand the concept of basic engineering mechanism

Following courses : Strength of material

Syllabus Contents

UNIT I BASICS AND STATICS OF PARTICLES

12

Introduction - Units and Dimensions - Laws of Mechanics – Lame’s theorem, Parallelogram and triangular Law of forces – Vectors –Vectorial representation of forces and moments – Vector operations on forces - Coplanar Forces – Resolution and Composition of forces – Resultant of several concurrent forces - Equilibrium of a forces – Forces in space - Equilibrium of particle in space - Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

UNIT II EQUILIBRIUM OF RIGID BODIES**12**

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon’s theorem - Equilibrium of Rigid bodies in two dimensions -Equilibrium of Rigid bodies in three dimensions.

UNIT III PROPERTIES OF SURFACES AND SOLIDS**12**

Determination of areas – First moment of area and the Centroid of standard sections – T section, I section, Composite figures, Hollow section – second moments of plane area – Rectangle, triangle, circle - T section, I section, Hollow section – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia – Basic concept of Mass moment of inertia.

UNIT IV FRICTION**12**

Frictional force – Laws of Coulomb friction – Cone of friction – Angle of repose – Simple contact friction – Sliding of blocks – Wedge friction - Ladder friction – Screw Jack – Belt friction - Rolling resistance.

UNIT V DYNAMICS OF PARTICLES**12**

Displacements, Velocity and acceleration, their relationship – Relative motion – Relative acceleration – Curvilinear motion of particles – Newton’s law – work energy equation – impulse and Momentum – Impact of elastic bodies.

Total: 60**Computer usage : Nil****Professional component**

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

Broad area: Mechanical Engineering**Test Schedule**

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 1 st Week	Session 1 to 20	2 Periods
2	Cycle Test-2	September 2 nd Week	Session 21 to 40	2 Periods
3	Model Test	October 2 nd Week	Session 1 to 60	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

	Correlates to program outcome		
	H	M	L
1. Students will understand the concepts of engineering mechanics	a, b,d,f,j,k		h
2. Students will understand the vectorial representation of forces and moments	f, g		h
3. Students will gain knowledge regarding center of gravity and moment of inertia and apply them for practical problems	f, g	j	h
4. Students will gain knowledge regarding various types of forces and reactions and tom draw free body diagram to quicker solutions for complicated problems.	f, g	j	h
5. Student will gain knowledge in solving problems involving work and energy	f, g	j	h
6. Student will gain knowledge on friction on equilibrium and its application.	f, g	j	h

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

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT-I			
1.	Introduction - Units and Dimensions	yes	T1
2.	Laws of Mechanics – Lamé’s theorem, Parallelogram and triangular Law of forces	yes	
3.	Vectors – Vectorial representation of forces and moments	yes	
4.	Vector operations on forces	yes	
5.	Coplanar Forces	No	
6.	Resolution and Composition of forces	yes	
7.	Resultant of several concurrent forces	yes	
8.	Equilibrium of a forces	yes	
9.	Forces in space	yes	
10.	Equilibrium of particle in space	yes	
11.	Equivalent systems of forces	yes	
12.	Principle of transmissibility	No	
UNIT-II			
13.	Introduction - Free body diagram	No	T1
14.	Types of supports and their reactions	yes	
15.	Requirements of stable equilibrium	yes	
16.	Moments and Couples	yes	
17.	Moment of a force about a point	yes	
18.	Moment of a force about a axis	yes	
19.	Vectorial representation of moments and couples	yes	
20.	Vectorial representation of couples	yes	
21.	Scalar components of a moment	yes	
22.	Varignon’s theorem	yes	
23.	Equilibrium of Rigid bodies in two dimensions	yes	
24.	Equilibrium of Rigid bodies in three dimensions	yes	
UNIT-III			
25.	Determination of areas	yes	T1
26.	First moment of area and the Centroid of standard sections	yes	
27.	T section, I section, Composite figures	yes	
28.	Hollow section	yes	
29.	second moments of plane area – Rectangle, triangle	yes	
30.	circle , T section, I section,	Yes	
31.	Hollow section	Yes	
32.	Parallel axis theorem	Yes	
33.	perpendicular axis theorem	Yes	
34.	Polar moment of inertia	Yes	
35.	Principal moments of inertia of plane areas	Yes	
36.	Principal axes of inertia – Basic concept of Mass moment of inertia.	Yes	

UNIT-IV			
37.	Introduction friction	Yes	T1
38.	Frictional force	Yes	
39.	Laws of Coulomb friction	Yes	
40.	Cone of friction	Yes	
41.	Angle of repose	Yes	
42.	Simple contact friction	Yes	
43.	Sliding of blocks	Yes	
44.	Wedge friction	Yes	
45.	Ladder friction	Yes	
46.	Screw Jack	Yes	
47.	Belt friction	Yes	
48.	Rolling resistance	Yes	
UNIT-V			
49.	Introduction to dynamics	Yes	T1
50.	Displacements,	Yes	
51.	Velocity	Yes	
52.	Acceleration, their relationship	Yes	
53.	Relative motion –	Yes	
54.	Relative acceleration	Yes	
55.	Curvilinear motion of particles	Yes	
56.	Introduction, Newton's law 1,2	yes	
57.	Newton's 3 Laws	Yes	
58.	work energy equation	Yes	
59.	impulse and Momentum	Yes	
60.	Impact of elastic bodies.	yes	

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%

Prepared by **S.Ramalingam**

Dated:

Addendum

ABET Outcomes expected of graduates of B.Tech / Civil / 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

Civil Engineering graduates will have knowledge to apply the fundamental principles for a successful profession and/or for higher education in Civil Engineering based on mathematical, scientific and engineering principles, to solve realistic and field problems that arise in engineering and non engineering sectors

PEO2: CORE COMPETENCE

Civil Engineering graduates will adapt to the modern engineering tools and construction methods for planning, design, execution and maintenance of works with sustainable development in their profession.

PEO3: PROFESSIONALISM

Civil Engineering Graduates will exhibit professionalism, ethical attitude, communication and managerial skills, successful team work in various private and government organizations both at the national and international level in their profession and adapt to current trends with lifelong learning.

PEO4: SKILL

Civil Engineering graduates will be trained 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

Civil Engineering graduates will be installed with ethical feeling, encouraged to make decisions that are safe and environmentally-responsible and also innovative for societal improvement.

BME202 - ENGINEERING MECHANICS

Course Teacher	Signature

Course Coordinator

HOD/Civil