

# CA2673: ENGINEERING MECHANICS

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## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Engineering Mechanics

### Subject Code

CA - Civil and Architectural Engineering

### Course Number

2673

### Academic Unit

Architecture and Civil Engineering (CA)

### College/School

College of Engineering (EG)

### Course Duration

One Semester

### Credit Units

3

### Level

B1, B2, B3, B4 - Bachelor's Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

Nil

### Precursors

Nil

### Equivalent Courses

BC2673 Engineering Mechanics

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

To introduce the use of equilibrium conditions (statics) in solving statically determinate structural analysis problems. This course provides the necessary background for studying the other courses in structural mechanics and analysis.

### Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Conceptually explain engineering mechanics theories commonly used for analysis and design in buildings and constructions, and can determine internal member forces and support reactions of statically determinate trusses	20	x	x	x
2	Discover appropriate mechanics approaches and apply them to solve some basic engineering problems in determining internal member forces and support reactions of statically determinate beams and frames	30		x	
3	Determine the static determinacy by member and joint counting, and stability of a structure by examining possibility of rigid body mechanism, as well as explain the concepts of virtual displacements and virtual work.	20		x	
4	Apply simplification to complicated structural analysis problems for determining the internal forces and support reactions of statically determinate structures by using the principle of virtual work, and discover their corresponding influence lines of statically determinate structures	30		x	

#### A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

#### A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

#### A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

### Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Students will engage in formal lectures to gain knowledge about addressing the basic principles and theories for force analysis in trusses and beams, shear force and bending moment diagrams for beams, and influence lines of beams.	1, 2, 3, 4	2
2	Tutorial	Students will engage in tutorial activities to get the solutions, and extend their skills for obtaining a solution	1, 2, 3, 4	1
3	Laboratory	Students will engage in the experiment test for evaluating the performance of roof truss under direct load.	3	1

**Assessment Tasks / Activities (ATs)**

ATs		CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Assignment	1, 2, 3, 4	24	-	Yes
2	Mid-term test	1, 2	20	-	No
3	Laboratory Report	3	6	-	No

**Continuous Assessment (%)**

50

**Examination (%)**

50

**Examination Duration (Hours)**

3

**Minimum Continuous Assessment Passing Requirement (%)**

30

**Minimum Examination Passing Requirement (%)**

30

**Additional Information for ATs**

To pass a course, a student must obtain minimum marks of 30% in both coursework and examination components, and an overall mark of at least 40%.

**Assessment Rubrics (AR)****Assessment Task**

Assignment

**Criterion**

1. ABILITY to USE suitable techniques to solve an engineering problem.

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

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**Assessment Task**

Mid-term test

**Criterion**

ABILITY to APPLY basic principles and mechanics approaches for the force analysis of rigid bodies in a coplanar force system

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

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**Assessment Task**

Laboratory Report

**Criterion**

1. ABILITY to OPERATE apparatus for the measurement of strains and forces in structures.

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

**Assessment Task**

Examination

**Criterion**

CAPACITY to EXPLAIN basic principles and mechanics approaches and apply them for the force analysis of rigid bodies, especially in determining the shear force, bending moment and influence lines of beams

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

**Part III Other Information****Keyword Syllabus**

Equilibrium of a Particle, Equivalent Systems of Forces, Equilibrium of Rigid Bodies, the Method of Joints and the Method of Sections, Shear and Bending Moment in a Beam, Shear-force & bending-moment diagrams, Principle of Virtual Work, Influence Line

**Reading List****Compulsory Readings**

	Title
1	Engineering mechanics / by R.V. Kulkarni, R.D. Askhedkar. New Delhi : S. Chand, 1985.
2	Engineering mechanics : statics / David J. McGill, Wilton W. King. Boston : PWS Engineering, c1985.
3	Engineering mechanics for structures / Louis L. Bucciarelli. Mineola, N.Y. : Dover Publications, 2009.

**Additional Readings**

<b>Title</b>	
1	Engineering mechanics / J.L. Meriam, L.G. Kraige. New York : Wiley, c1997.
2	Engineering mechanics. Statics & dynamics principles / Anthony Bedford, Wallace Fowler. Upper Saddle River, N.J. : Prentice Hall, c2003.
3	Engineering mechanics: statics dynamics / I.C. Jong, B.G. Rogers. Philadelphia : Saunders College Pub., c1991.
4	Engineering mechanics : principles of statics and dynamics / R.C. Hibbeler. Upper Saddle River, NJ : Pearson/Prentice Hall, c2006.
5	Advanced engineering analysis: the calculus of variations and functional analysis with applications in mechanics / Leonid P, Lebedev, Michael J, Cloud, Victor A. Eremeyev. Singapore: World Scientific, 2012.