CA2673: ENGINEERING MECHANICS

Effective Term
Semester A 2022/23

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 understand 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		
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 static determinacy by member and joint counting; stability of a structure by examining possibility of rigid body mechanism	20		x	
4	simplify complicated structural analysis problems to determine 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.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Address 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	Explain how to get the solutions, and show skills to have a correct solution.	1, 2, 3, 4	1
3	Laboratory	Explain how to do the experiment for a Roof Truss with Direct Load.	3	1

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignment	1, 2, 3, 4	24	
2	Mid-term test	1, 2	20	
3	Laboratory Report	3	6	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

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

Assessment Task

Mid-term test

Criterion

1. ABILITY to APPLY the basic principle and the scientific techniques in solving the problems involved in Fourier series, Partial differential equation and linear programming techniques.

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

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

1. CAPACITY to UNDERSTAND the mathematical theories and USE them in solving 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

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

	Title
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: Would Scientific, 2012.