

I Semester

ELEMENTS OF CIVIL ENGINEERING AND MECHANICS			
Course Code	21CIV14/24	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3 Hrs.
Course objectives: <ul style="list-style-type: none"> • To make students to learn scope of various fields of civil engineering. • To develop students ability to analyse the problems involving forces, moments with their applications. • To develop the students ability to find out the centre of gravity and moment of inertia and their applications. • To make the students to learn about the kinematics and kinetics and their applications. 			
Pedagogy (General Instructions) These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> 1. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes. 2. Arrange visits to nearby sites to give brief information about the Civil Engineering structures. 3. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle. 4. Encourage collaborative (Group Learning) Learning in the class. 5. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking. 6. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it. 7. Topics will be introduced in a multiple representation. 8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 10. Individual teacher can device the innovative pedagogy to improve the teaching-learning. 			
Module-1			
Overview of Civil Engineering Systems: Introduction to structural engineering, geotechnical engineering, Construction technology, hydraulics, water resources and irrigation engineering transportation engineering, environmental and sanitary engineering, GIS, earthquake engineering. Role of civil engineers in the development of nation.			
Building materials: Stone, brick, wood, glass, aluminum, cement, aggregates, concrete, steel, RCC, PSC, smart materials.			
Pedagogy	Site visits and report preparation, activity based learning, power point presentation, videos.		
Module-2			
Analysis of force systems : Force, system of forces, superposition, transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, polygonal law, Resultant of concurrent coplanar force system, coplanar non concurrent force system, moment of forces, couple, Varignons theorem, resultant of coplanar non concurrent force system, free body diagram, Lamis theorem, equations of equilibrium, equilibrium of concurrent and non concurrent coplanar force system			
Friction: Types of friction, laws of friction, limiting friction, co-efficient of friction concept of static and dynamic friction, numerical problems on impending motion on horizontal and inclined planes along with connected bodies,			
Pedagogy	Chalk and talk, videos, ppt, animations		

Module-3	
<p>Centroid: Introduction, methods of determining the centroid, locating the centroid of simple figures from first principle, centroid of composite and built up sections.</p> <p>Moment of inertia: Introduction, method of determining the second moment of area of plane sections from first principles, parallel axis theorem and perpendicular axis theorem section modulus, radius of gyration, moment of inertia of composite area and built up sections, concept of product of inertia (No problem).</p>	
Pedagogy	Chalk and talk, videos, ppt, animations
Module-4	
<p>Support reactions : Types of loads and types of supports, statically determinate and indeterminate beams, support reactions in beams, Numerical problems on support reactions for statically determinate beams (point load, udl, uniformly varying loads and moments)</p> <p>Analysis of trusses: Types of trusses, analysis of statically determinate trusses using method of joints and method of sections.</p>	
Pedagogy	Chalk and talk, videos, ppt, animations
Module-5	
<p>Kinematics : Displacement, average velocity, instantaneous velocity, speed, acceleration, average acceleration, variable acceleration, acceleration due to gravity, Newton's law of motion, rectilinear motion and numerical problems, curvilinear motion, super elevation, projectile motion, relative motion, numerical problems, motion under gravity, numerical problems</p> <p>Kinetics: D'Alemberts principle and its application in plane motion and connected bodies including pulleys.</p>	
Pedagogy	Chalk and talk, videos, ppt, animations
<p>Course outcome (Course Skill Set) At the end of the course the student will be able to :</p> <ul style="list-style-type: none"> • Understand the various fields of civil engineering. • Compute the resultant of a force system and resolution of a force. • Comprehend the action for forces, moments and other types of loads on rigid bodies and compute the reactive forces. • Locate the centroid and compute the moment of inertia of regular and built up sections. • Analyse the bodies in motion. 	

Assessment Details (both CIE and SEE)

(methods of CIE need to be define topic wise i.e.- MCQ, Quizzes, Open book test, Seminar or micro project)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration). Based on this grading will be awarded.

Continuous Internal Evaluation:

1. Methods suggested: Test, Open Book test, Written Quiz, Seminar, report writing etc.
2. The class teacher has to decide the topic for closed book test, open book test, Written Quiz and Seminar. In the beginning only teacher has to announce the methods of CIE for the subject.

Semester End Examination:

Theory SEE will be conducted by University as per scheduled time table, with common question papers for subject

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:**Books**

1. R. C. Hibbeler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
2. Bansal R. K., A Text Book of Engineering Mechanics, Laxmi Publications.
3. Andy Ruina and Rudra Pratap, Introducing to Statics and Dynamics, Oxford University Press.
4. Reddy Vijaykumar K and K Suresh Kumar, Engineering Mechanics.
5. F.P. Beer and E. R. Johnston, Mechanics for Engineers, Statics and Dynamics, McGraw Hill.
6. Irving H. Shames, Engineering Mechanics, Prentice Hall.

Web links and Video Lectures (e-Resources):

- <https://drive.google.com/file/d/1KD6Mur-D0c2tWcNUNYFh6PRWXWG5bRZt/view?usp=sharing>
- https://drive.google.com/file/d/1AvpTe1UkCqBGC-ALyTyD_IeIhXN5hqbQ/view?usp=sharing
- https://drive.google.com/file/d/16sbpXCzi4cR5FK5OsWtvUZWH_kFVw-S9/view?usp=sharing
- <https://drive.google.com/file/d/15OWUoLVHDb5l-GvfpQQOMFN1xbmEWrzI/view?usp=sharing>
- https://drive.google.com/file/d/186b9_f9RbAizH4jfqBQW-bG_ZCTjT-/view?usp=sharing

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- https://drive.google.com/file/d/1KwuJIP2qsOm_x7ODZiCYZynSp70Lnx00/view?usp=sharing
- https://drive.google.com/file/d/1bRVWChQpMEEgMIS4nRX_wDiK3phRpLlg/view?usp=sharing
- <https://drive.google.com/file/d/1nYT59Xxys2bk0QJlzl2Y9TRD-XqeRzZP/view?usp=sharing>
- https://drive.google.com/file/d/1Sci0ekWSWv8q_xT-G_YGQUBItksVM2el/view?usp=sharing