College Code: QA

BRILLIANT INSTITUTE OF ENGINEERING & TECHNOLOGY

(Approved by AICTE, New Delhi, Affiliated to JNTU-Hyderabad)
Abdullapur(V), Abdullapurmet (M), R.R. Dt. Hyderabad - 501505
Website: www.b-iet.ac.in, e-mail: principal@b-iet.ac.in

DEPARTMENT OF CIVIL ENGINEERING

Academic Year 2021 – 22

Course	**Structural Analysis-I**	Year / Semester	**II / II**
Topic	**Deflection of Propped Cantilever and Fixed Beams**	Innovative Method Chosen	**Problem Based Learning**

Problem Based Learning

Problem-Based Learning (PBL) is an active learning approach in which students learn concepts by solving real-world and practical engineering problems. It encourages students to work individually or in groups, identify problems, analyze available information, develop possible solutions, and apply theoretical knowledge to practical situations. The faculty member acts as a facilitator and guides students throughout the learning process.

In Irrigation Engineering, Problem-Based Learning can be implemented by presenting students with practical problems related to the design of weirs on permeable foundations using creep theories. Students analyze the foundation soil conditions, seepage characteristics, hydraulic head, creep length, uplift pressure, and safety against piping to determine the suitable design parameters. Common problem-based activities include:

- Determination of the required creep length for a weir founded on permeable soil.•
- Design of a suitable weir floor length based on• Bligh's creep theory.
- Analysis of seepage and determination of the weighted creep length using• Lane's weighted creep theory.
- Evaluation of the safety of a weir against• piping and seepage failure under different foundation conditions.

1. Deflection of Propped Cantilever :

- The propped cantilever is a statically indeterminate beam having one end fixed and the other end supported by a prop.
- Deflection analysis is carried out by determining the slope and deflection at different points along the beam.
- The compatibility condition at the prop is that the vertical deflection at the prop location is zero.
- The unit load method, moment-area method, or conjugate beam method can be used to determine the deflection of a propped cantilever.
- The analysis involves considering the support reactions, bending moments, loading conditions, and flexural rigidity (EI) of the beam.

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2. Deflection of Fixed:

- A fixed beam is a beam whose both ends are fixed against rotation and vertical or horizontal translation.
- The fixed supports develop vertical reactions and fixing moments, making the beam statically indeterminate.
- Deflection analysis is carried out by determining the slope and deflection at various points along the beam.
- At both fixed ends, the slope and deflection are zero, which are important boundary conditions for analysis.

Methods such as the double integration method, moment-area

Objectives:

1. To engage students in identifying, analyzing, and solving real-world problems, and as an aid to applying theoretical knowledge, making decisions, and developing practical solutions.
2. To help students develop critical and creative thinking, improve their problem-solving ability, and enhance teamwork and decision-making skills at the same time.

Outcomes:

1. The learning ability of students will get enhanced by encouraging them to apply theoretical knowledge to real-world problems through active learning and practical activities.
2. Problem-solving, critical thinking, teamwork, and decision-making abilities of students will get improved.
3. method, unit load method, and conjugate beam method can be used to determine beam deflections.

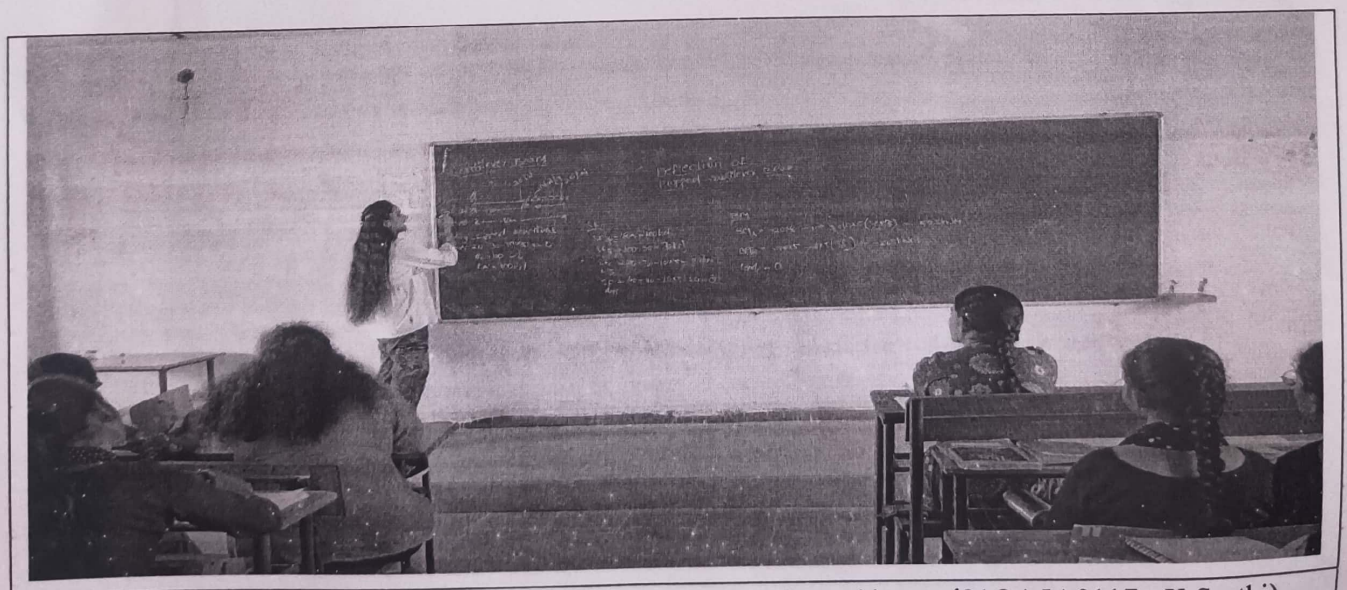


Figure 1: Problem based learning on Propped Cantilever and Fixed beam (21QA5A0117 - K.Sruthi)

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Figure21: Performed before in the class 20QA1A0112, 21QA5A0113, 21QA5A0117, 21QA5A0122

Coordinator

Head of the Department

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DEPARTMENT OF CIVIL ENGINEERING

Date: 10-06-2022

To
The Principal,
Brilliant Institute of Engineering and Technology,
Abdullapur (V & M) – 501505,
R. R. District, Hyderabad.

Respected Sir,

Sub: Seeking Permission – Innovative TLP – Req. – Reg.

We are hereby bringing to your kind notice that the Department of Civil Engineering is going to conduct an innovative teaching-learning session, i.e., Problem-Based Learning (PBL), for our students. Problem-Based Learning is a student-centered teaching methodology in which students are provided with a practical engineering problem and encouraged to analyze the problem, discuss possible solutions, apply theoretical concepts, and present their findings.

We have scheduled the program on 24-06-2022 at 11:05am to 12:45pm for the II - II Semester students. The topic selected for the session is "Deflection of propped cantilever ad Fixed beams" The activity will provide students with an opportunity to apply their theoretical knowledge to a practical structural engineering problem and develop their problem-solving, analytical, teamwork, design, and communication skills.

This will be a good knowledge-sharing and learning platform for the students and will enhance their active participation in the teaching-learning process.

In this regard, we kindly request you to grant permission to conduct the Problem-Based Learning activity for the students.

Thanking you, Sir.

Yours Sincerely,

Head of the Department

Head of the Department
Department of Civil Engineering
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DEPARTMENT OF CIVIL ENGINEERING

Date: 21-06-2022

Circular

This is to inform faculty members and students of the Department of Civil Engineering that the department is going to conduct a Problem-Based Learning (PBL) activity involving faculty along with students on the topic **"Deflection of propped cantilever ad Fixed beams"** on 24-06-2022 between 11:05am to 12:45pm. This will be a good knowledge-sharing and problem-solving platform for students to analyze practical engineering problems, discuss ideas, develop suitable solutions, and apply their theoretical knowledge through collaborative learning.

Hence, all the students of II Year II Semester and students who are interested to participate are directed to enroll their names with the concerned faculty on or before 23-06-2022.

Head of the Department

Head of the Department
Department of Civil Engineering
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Copy to:

Circulate in all Civil classrooms.
Display in the all notice boards
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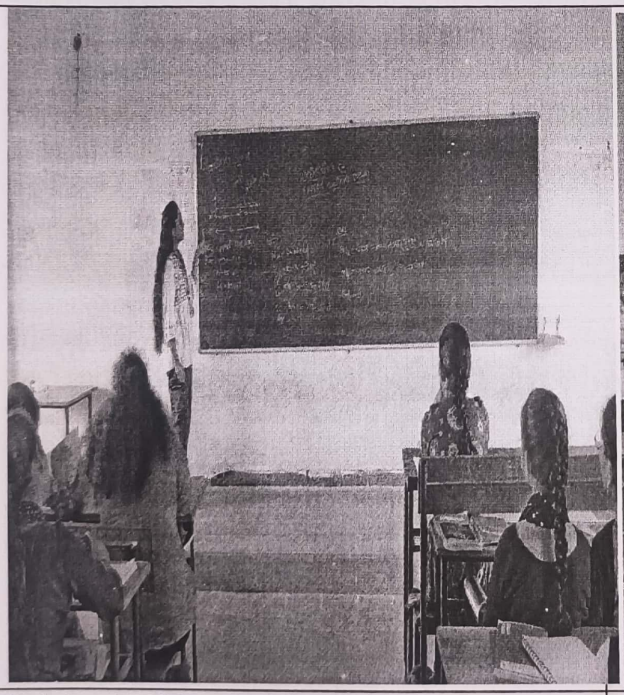
Problem Based Learning :

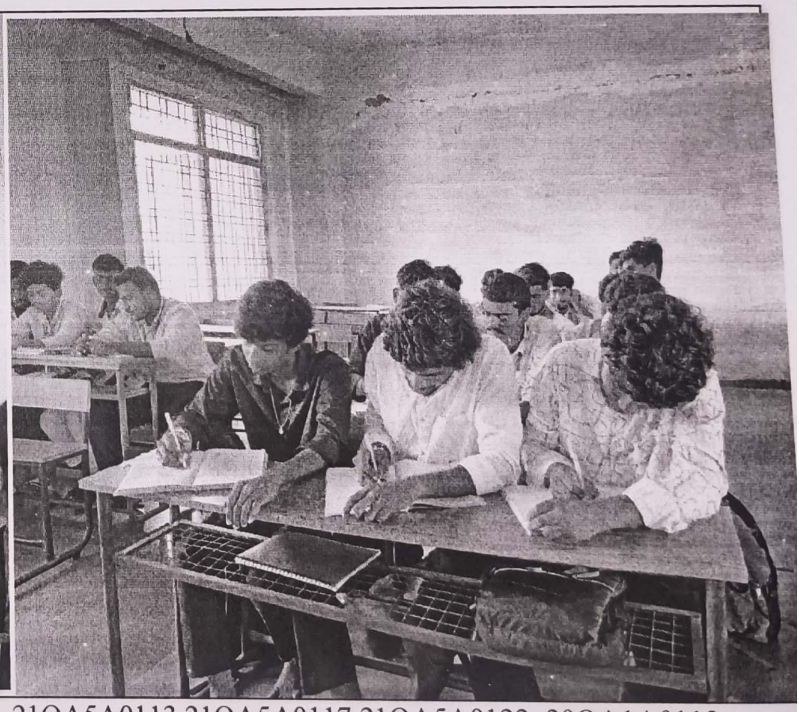
Problem-Based Learning (PBL) is a modern teaching method where students learn by solving a practical or real-world engineering problem.

Explanation: In a normal classroom, the faculty explains the concepts and students mainly learn through lectures and exercises.

In **Problem-Based Learning**, students are given an engineering problem first. They analyze the problem, discuss possible solutions, apply their theoretical knowledge, perform calculations, and develop a suitable solution with guidance from the faculty.

The method encourages students to share ideas, work collaboratively, think critically, and solve engineering problems creatively.





Solving Problem on Propped Cantilever and Fixed Beam	21QA5A0113,21QA5A0117,21QA5A0122, 20QA1A0112

It Works

- **Problem Identification:** Students are given a practical Structural Analysis -I problem involving the design of a propped cantilever and fixed beam.
- **Group Formation:** Students work in small groups and discuss the given problem.
- **Problem Analysis:** Students identify the given data, loading conditions, span, support conditions, design requirements, and appropriate methods of structural analysis.

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DEPARTMENT OF CIVIL ENGINEERING

- **Application of Knowledge:** Students apply concepts such as support reactions, shear force, bending moment, deflection, flexural strength, and structural member design.
- **Solution Development:** Students determine the support reactions and internal forces, prepare the required shear force and bending moment diagrams, and perform the necessary design calculations for the propped cantilever and fixed beam.
- **Faculty Guidance:** The faculty guides the students, clarifies doubts, and provides suggestions whenever required.
- **Presentation:** Each group presents its structural analysis procedure, support reactions, shear force and bending moment calculations, SFD/BMD diagrams, and final solution for the propped cantilever and fixed beam.

It is useful

- Students develop problem-solving skills.
- Improves analytical and critical-thinking abilities.
- Helps students connect theoretical knowledge with practical engineering applications.
- Encourages teamwork and collaborative learning.
- Improves design and decision-making skills.
- Develops communication and presentation skills.
- Promotes active participation and independent learning.

Example: A structural engineering faculty gives students a problem to analyze and design a propped cantilever and fixed beam subjected to specified loading conditions.

Students work in groups to identify the span, support conditions, loading pattern, and design requirements, calculate support reactions and internal forces, prepare the shear force and bending moment diagrams, and determine the critical design values. Finally, each group presents its solution and explains the analysis and design procedure to the class.

Coordinator

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Summary Report
On
Flipped class room

The Department of Civil Engineering conducted a Problem-Based Learning (PBL) session on the topic "Design of Propped Cantilever and Fixed Beam." The main objective of this activity was to enhance the problem-solving skills, analytical skills, technical knowledge, and design abilities of students. The activity also helped students develop confidence in analyzing structural problems and presenting their solutions.

The event was organized in the form of a group-based problem-solving activity on the analysis and design of propped cantilever and fixed beams and their engineering applications. The session encouraged active participation, collaborative learning, and application of theoretical concepts to practical structural engineering problems. The activity was mapped to Program Outcomes (PO1, PO2, PO3), focusing on engineering knowledge, problem analysis, and design/development of solutions.

A large number of students actively participated in the activity and worked in groups to analyze the given structural problems. Students identified the span, support conditions, loading pattern, and design requirements; calculated support reactions and internal forces; prepared Shear Force Diagrams (SFD) and Bending Moment Diagrams (BMD); and determined the critical design values. Each group presented its solution and explained the analysis and design procedure to the class.

On this occasion, **Dr. Shaik Rusthum, Principal**, motivated the students to participate actively in such academic activities and appreciated their enthusiasm. He congratulated the organizing committee for successfully conducting the activity and advised the faculty members to organize more interactive and innovative learning activities to develop problem-solving abilities, leadership qualities, teamwork, and technical competence among students.

The program concluded successfully with positive feedback from both students and faculty members. The Problem-Based Learning approach proved to be an effective method for improving student engagement, collaborative learning, analytical thinking, and conceptual understanding of structural analysis and design.

The competitive spirit among the students. The total number of students participated 32.

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DEPARTMENT OF CIVIL ENGINEERING

Winner Notification

S.NO	Roll Number	Name Of The Student
1	20QA1A0112	M. Bhavya
2	21QA5A0113	G.Mukesh
3	21QA5A0117	K.Sruthi
4	21QA5A0122	M.Laxmi Priya

Coordinator

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