Module (Course Syllabus) Catalogue

2023-2024

College/ Institute	Erbil Technical Engineering College	
Department	Civil Engineering Department	
Module Name	Theory Of Structures -1-	
Module Code	STA503	
Degree	Technical Diploma ☐ Bachler ■ High Diploma ☐ Master ☐ PhD ☐	
Semester	5th	
Qualification	B.Sc	
Scientific Title	Engineer	
ECTS (Credits)	6	
Module type	Prerequisite ☐ Core ■ Assist. ☐	
Weekly hours		
Weekly hours (Theory)	(4)hr Class	(162) Total hrs Workload
Weekly hours (Practical)	( )hr Class	( ) Total hrs Workload
Number of Weeks	15	
Lecturer (Theory)	Dr. Sarkawt Asaad Hasan	
E-Mail & Mobile NO.	sarakot.hasan@epu.edu.iq- 07506473393	
Lecturer (Practical)		
E-Mail & Mobile NO.		
Websites		

Course Book

<table>
<tr><td>Course Description</td><td>This course presents the required knowledge in the field of structural analysis of trusses, beams and frames. The course will help the students to a better understanding the for concept of structural members behaviors under different loading types leading to a better understanding for the design requirements.

This course requires a solid background in the Engineering Mechanic and Strength of Material and Calculus.</td></tr>
<tr><td>Course objectives</td><td>• Develop skills in determining reactions and loads on structures.
• Familiarize the student with the basic concepts of truss analysis.
• Develop a basic understanding of influence lines.
• Performing approximate analysis for indeterminate structure.</td></tr>
<tr><td>Student’s obligation</td><td>The students are required to:
• Attend all the lectures and participate in the discussion and the class work;
• Reading and practising on the problems given in previous lectures before attending a new one;
• Performing the required tasks of preparation of Reports, Quizzes, Homework, projects
• Participate in all tests and exams.</td></tr>
<tr><td>Required Learning Materials</td><td>Lecture Notes…..Reference Books……Data Show… Laptop…..</td></tr>
<tr><td>Evaluation</td><td>
<table>
<tr><th colspan="2">Task</th><th>Weight (Marks)</th><th>Due Week</th><th>Relevant Learning Outcome</th></tr>
<tr><td rowspan="6">Assignments</td><td>Homework</td><td>10</td><td>4,8,12</td><td>2 to 6</td></tr>
<tr><td>Class Activity</td><td>2</td><td>1 to 12</td><td>1 to 6</td></tr>
<tr><td>Report</td><td>8</td><td>12</td><td>7</td></tr>
<tr><td>Seminar</td><td>8</td><td>13</td><td>7</td></tr>
<tr><td>Essay</td><td></td><td></td><td></td></tr>
<tr><td>Project</td><td>---------</td><td></td><td></td></tr>
<tr><td colspan="2">Quiz</td><td>8</td><td>4,8,12</td><td>2 to 6</td></tr>
<tr><td colspan="2">Lab.</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Midterm Exam</td><td>24</td><td>8</td><td>1 to 4</td></tr>
<tr><td colspan="2">Final Exam</td><td>40</td><td>15</td><td>1 to 6</td></tr>
<tr><td colspan="2">Total</td><td></td><td></td><td></td></tr>
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<tr><td>Specific learning outcome:</td><td>The students by the end of the course will be able to:
1- Understand the concepts of idealization in structures and basic member force mechanism
2- Understand the load path and tributary areas in structures and basic mechanism of different loadings</td></tr>
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	3- Identify Stable/ Unstable Structures, and statically determinate/indeterminate structures. 4- Analyse determinate structures for moments/shear/axials 5- Understand the concept of effect of the location of moving load on the structure behaviour 6- Perform fast analysis (approximate) for indeterminate framed structures. 7- Being able to perform Deflection calculation for beams 8- Being able to research for information/knowledge about one of the Course topics or any related subjects approved by the lecturer.
Course References:	▪ Key references: -"Structural Analysis" R.C. Hibbeler, 8th Edition, Pearson Education, Inc. New Jersey, USA. ▪ Useful references: - " Structural Analysis: In theory and Practice", Williams, Elsevier, 2009 - "Examples in Structural Analysis", William M.C.McKenzie, 1st Edition, Taylor & Francis, Milton Park, Uk, 2006. ▪ Magazines and review (internet):

Course topics (Theory)	**Week**	**Learning Outcome**
1- *Introduction.* *Structural Elements* *Type of Structures.* *Loading* *Idealized Structures* *Type of Supports and Joints*	1	1
2- *Beam Tributary Loading*	2	2
3- *Determinacy and Stability of Structures.*	3	3
4- *Analysis of Statically Determinate Trusses and Beams*	4-5	4
5- *Analysis of Statically Determinate Frames*	6-7	4
6- *Influence Line for Statically Determinate Structures.*	8-9	5
7- *Approximate Analysis of Structures.*	10	6
8- *Deflections of Statically Determinate Structure using Conjugated Beam Method*	11-12	7
Practical Topics	**Week**	**Learning Outcome**

9-

Questions Example Design

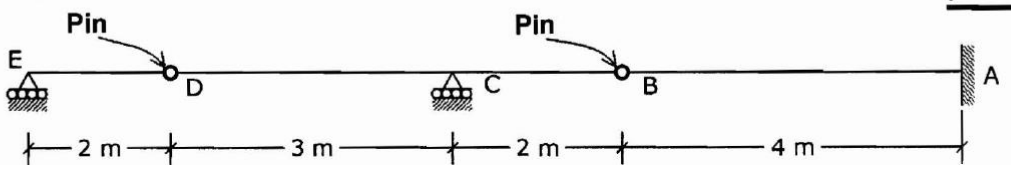
1. Calculation Questions: In this type of exam the questions usually start with:
Classify the structure, Analyse, Compute the defection**,** , ……
See an Example below:

Q1 : For the beam shown in Fig.(1):

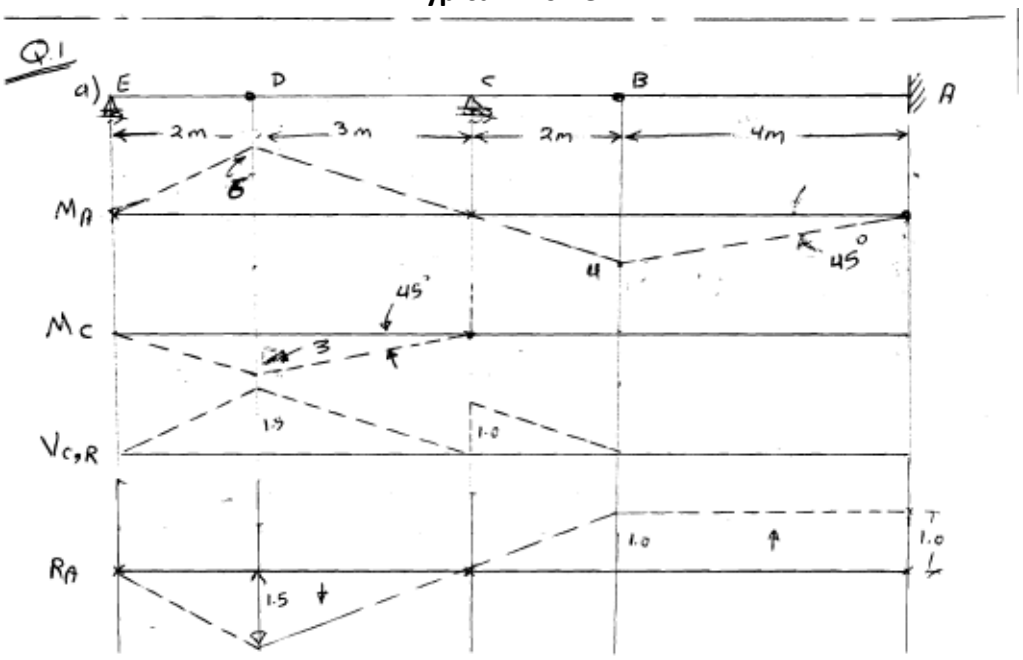
a) Construct the influence line for the reaction at A, the moment at A, the moment at C, and the shear at the right of C. Show values on the constructed influence line.

b) Find the maximum reactions at A due a moving concentrated live load of 100 kN, and a moving distributed live load of 10 kN/m. (Hint: the moving distributed load could occupy the full length of the beam or any partial length of the beam.) **(30 Marks)**

Fig. (1)



Typical Answer



b) Reaction at A

b1) First case : the R_A to the Top ↑

$$R_{A_1} = 10\ KN/m.l \times \left[4 \times 1 + \frac{1 \times 2}{2}\right] + 100\ KN \times 1 = 150\ KN \uparrow$$

b2) 2nd Case : The R_A to the Bottom ↓

$$R_{A_2} = 10\ KN/m.l \times \left[\frac{5 \times 1.5}{2}\right] + 100\ KN \times 1.5 = 187.5\ KN \downarrow$$

The maximum reaction at A = 187.5 ↓

Extra notes:

External Evaluator