

Date:	Examination No.: 15367	Version:1/9/2019	Start: 1/9/2022
Module Name - Code	Concrete Design – 4124		
Module Language:	English		
Responsible:	Dr. Ali Izzadin Marouf		
Lecture (s):			
College:	College of Engineering – Salahaddin University		
Duration:	15 week – 1 semester		
Course outcomes:	<p>At the end of course the student will learn the basic concepts of concrete design by studying the components of concrete, ratio of mixing , transferring , placing of concrete, compact the concrete and curing it, also studying the reinforcement , the mechanic of reinforced of concrete, and Stages of concrete failure.</p> <p>The student also will learn the Principles and theories of design a single and double reinforced beam and solve a number of practical solution about this subject.</p> <p>As well as a sound knowledge of the major areas of the subject by studying slabs and types of slabs, one way slab, two way slabs and design the two types of slabs, and finally studying columns , analysis and design of columns.</p>		

Course Content:	<p>The Cement (definition , types , the methods of produce , properties)</p> <p>Aggregates (Include smooth and rough aggregates).</p> <p>Mixing the concrete and cement which used for concrete acts, then the transporter of concrete, problems which may be happening through the transporter, placing of concrete, compact the concrete and curing of concrete.</p> <p>Concrete tests:</p> <p>Include concrete in comp., method of use the cylinders, concrete in tension in many types for example: direct test, cylinder split test, modulus in rupture</p> <p>Studying the characteristics and recipes of concrete That occur in concrete including shrinkage, creep and temperature effect.</p> <p>- Studying the purpose of using the steel bars in the concrete in efficient alone specially in tension zone.</p> <p>- studying the reasons of using the steel bars with the concrete by the link which make between them, the steel bars help the concrete in other cases as well as common traits which lead to work together.</p> <p>Mechanics of Reinforced concrete, also studying the bending moment which include studying the weak places in normal concrete and how to processing weak places by using reinforced steel.</p> <p>- Stages of concrete failure:</p> <p>Include three stages:</p> <p>a- Stress elastic and section uncracked which include Transformed section method</p> <p>b- Stress elastic and section cracked, and it explains how to get the crack in beams and solution examples in this type of crack.</p> <p>c- Ultimate strength:</p> <p>In this stage the concrete member surrendered and failed, and in this stage explain the ductility in concrete, the reasons of crack, under reinforced beam, and over reinforced beam.</p> <p>-Structural Safety:</p> <p>In this subject the student study the reason of the resort to safety in design and reduce capacity in the analysis in the concrete structures in order to avoid problems which facing the concrete member through stages of implementation which is treated.</p> <p>Analysis of single Reinforced beam</p> <p>Member dimensions:</p> <p>The student study how choose the width and the depth, concrete cover for single reinforced beams, exposed to the weather or in contact with the crowned, choose the diameter of steel which used in the beams and the diameter between steel rods.</p> <p>Design of single reinforced beam</p> <p>- Double reinforced beams:</p> <p>- Study the reason of use the steel in the tension and comp.</p> <p>- Solution an question of analysis of double reinforced beam</p> <p>- Design of double reinforced beam.</p> <p>- Shear and diagonal tension in beam;</p> <p>-Instruction the student the third method which lead to failure the concrete, a method of shear failure, in addition to comp. and tension failure, critical section which lead to failure, the location of failure and the distance from the supports.</p> <p>- Instruction the student the failure which occurs in the concrete member, including the failure occurs because of the flexural which is called (Flexural crack), the failure which occurs because of the which is called (Shear crack) and the failure which is caused by moment and shear together (Flexural - Shear crack).</p> <p>-ACI - code provision for shear design</p> <p>what it need and how it design, including beam with no web reinforcement according to ACI - code and web reinforcement is required practical Solution to solve how to design reinforced beam to reduction failure phenomenon by Shear failure.</p> <p>-Slabs</p> <p>- Instruction the student the types of slabs, including beams based on walls or slabs based on concrete columns, and studying another types of slabs including (Flat slab) which the slab based on the column directly, the problems that faced, Ribbed slab including (one way ribbed) and (two way ribbed slab).</p> <p>-Types of slabs depending on analysis, including:</p> <p>- One way slabs</p> <p>Instruction the student the meaning of one way slab, how to distribute the loads in this case, the method of reinforced this type of slab by using main and secondary reinforcement of deflation, temperature and design of two way slab.</p> <p>- Design of one way slab</p>
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Design of two way slabs

Instruction the student that in this case it is a two way moments, so the reinforced must be two main way.

- It is chosen method of two way slabs by Coefficient method by using tables which specialized to find moment coefficient for live and dead load that inflected on slab.

Short column Design

In the beginning define the column and the important of column in carry inflected loads which resulting from live and dead loads for buildings and instruction the student the types of columns and the materials using in design columns. the ratio of less reinforced according to ACI - code and fit the width and high for column and how choose it according to loads which inflected on it and how choose a diameters and number of steel bar for column because it is vary in diameters of reinforced from other concrete members as well as the distance between rings in column , the objective of use rings , the method of casting columns and its opportunities.

- Analysis of column

- Tied column

- Circle column.

Design of short column

- Tied column

- Circle column

Literature:	Design of concrete structures, by Wilson. ACI code 318 - 89 R. Concrete fundamental, by P.M.Ferguson. R. Concrete Design, by Wang and Salmon. هانيمحمد فهمي د. الخرسانة المسلحة تصاميم
Type of Teaching:	2 hrs in theoretical lectures
Pre-requisites:	
Frequency:	Yearly in fall semester
Requirements for credit points:	For the award of credit points, it is necessary to pass the module exam. It contains: Midterm examination during the academic semester. Assignments and Final examination. Student's attendance is required in all classes.
Credit point:	4
Grade Distribution:	The following grade system is used for the evaluation of the module exam: The module exam is based on the summation of two categories of evaluations: First: (40%) of the mark is based on the academic semester effort which includes - One examination during the academic semester = 30% . - Assignments = (10%) . Second: (60%) of the mark is based on final examination that is comprehensive for the whole of the study materials reviewed during the academic semester.
Work load:	The workload is 90 hrs. It is the result of 30 hrs. attendance and 60 hrs. self-studies (Assignments, preparation for exam).