

DEPARTMENT OF CIVIL AND ENVIRONMENTAL
ENGINEERING
ROY G. PERRY COLLEGE OF ENGINEERING
PRAIRIE VIEW A&M UNIVERSITY

ASSESSMENT REPORT

CVEG 4300 REINFORCED CONCRETE

FALL 2021 SEMESTER

INSTRUCTOR: DR. R. RADAKRISHNAN

TABLE OF CONTENTS

- 1. Cover Page**
- 2. Detailed Course Syllabus**
- 3. End of Semester Outcomes Assessment Report (New Format)**
- 4. Grade Sheet Showing Student and Class Performance in Outcomes**
- 5. Supporting Outcome Specific Assignments**

Assignments are measuring and assessing the following:

ABET Criterion

(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Detailed Course Syllabus
(Distributed to Students at the beginning of the Semester)

1.	Course number and name:	CVEG 4300 – REINFORCED CONCRETE
2.	Credits and contact hours:	3 credit hours; 3 contact hours
3.	Instructor's or course coordinator's name:	Dr. Ramalingam Radhakrishnan, P.E.
4.	Textbook: Title:	Design of Reinforced Concrete
	Author:	Jack C. McCormac and Russell H. Brown
	Publisher, Year & Edition:	Wiley, 2016, 10 th Edition
	a. Other Supplemental material	Class Handouts and Notes; Building Code Requirements for Reinforced Concrete, ACI 318-19.
5.	Specific course information	
	a. Brief description of the content of the course (catalog description)	CVEG 4013. Reinforced Concrete. (3-0) Credit 3 semester hours. Properties of concrete and reinforcement; design methods; codes; load; flexure, shear, bonds, and deflections; analysis and design of different kinds of beams and columns; introduction to design of footings, slabs, and retaining walls; and introduction to computer-aided design.
	b. Prerequisites or Co-requisites	CVEG 3304
	c. *Indicate whether a required, elective, or selected elective (as per definition provided) course in the program	Required
6.	Specific goals for the course	Students will be able to:
	a. specific outcomes of instruction (e.g., The student will be able to explain the significance of current research about a particular topic.)	(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
	b. Explicitly indicate which of the student outcomes listed in	This course addresses: Outcome 2
	Criterion 3 or any other outcomes are addressed by the course.	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

7.	Brief list of topics to be covered	1. Introduction to Concrete and Reinforced Concrete (3 Hours) 2. Flexural Analysis of Beams (5 Hours) 3. ACI Code (1 Hour) 4. Beams and Slabs (3 Hours) 5. T Beams and Doubly Reinforced Beams (3 Hours) 6. Serviceability (3 Hours) 7. Bond and Development Lengths (3 Hours) 8. Shear and Diagonal Tension (6 Hours) 9. Introduction to Columns (3 Hours) 10. Axially Loaded Columns with Bending (3 Hours) 11. Slender Columns (3 Hours) 12. Wall Footings (3 Hours) 13. Column Footing (3 Hours)
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CVEG 4300-P01 Reinforced Concrete

Fall 2021

General Course Information

Information Item	Information
Instructor:	Dr. R. Radha, P.E., F. ASCE, Professor
Section # and CRN:	P01 and CRN: 17735
Office Location:	Wilson Room 110 C
Office Phone:	936 261 1657
Email Address:	RaRadha@pvamu.edu
Office Hours:	MW 11:00-12:00 AM; and 2:00-3:00 PM
Mode of Instruction:	Face to Face
Course Location:	PVAMU campus New EE Bldg Room 139
Class Days & Times:	MW 3:30 – 4:50 PM
Catalog Description:	Credit 3 semester hours. Properties of concrete and reinforcement; design methods; codes; load; flexure, shear, bonds, and deflections; analysis and design of different kinds of beams and columns; introduction to design of footings, slabs, and retaining walls; and introduction to computer-aided design.
Prerequisites:	CVEG 3304 Structural Analysis or CVEG 3073 Structural Analysis
Co-requisites:	None
Required Text(s):	Jack C. McCormac and Russel Brown, Design of Reinforced Concrete, 10th Edition, 2016, Wiley.
Recommended Text(s):	Building Code Requirements for Reinforced Concrete ACI 318-19.

General Course Information Table

Student Learning Outcomes:

Course Goals or Overview:	
	To develop the ability to understand and apply knowledge of the fundamentals of reinforced concrete and to design reinforced concrete slabs, beams, columns and footings
Course Objectives/Accrediting Body ABET Standards Met: SACS and ABET	
To provide the student with a clear and thorough understanding of the theory and applications of reinforced concrete and to design a system, component, or process to meet desired needs by working on a project which includes design of a complete structure.	
1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics 2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
At the end of this course, the student will demonstrate	

		Civil Engineering Program Objectives		ABET Criteria
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	1, 2, 3, and 4		1
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	1, 2, 3, and 4		2

Table: Outcome Measures

Course	CVEG Objectives				ABET Criterion 3						
	1	2	3	4	1	2	3	4	5	6	7
CVEG 4300	x	x	x	X		x					

x are the outcomes measured for this course

Civil Engineering Program Outcomes (Student Learning Outcomes) **ABET EAC Criterion 3 {[1] - [7] Student Outcomes (SOs)}**

- 1) an ability to identify, formulate, and solve **complex** engineering problems by applying principles of engineering, science, and mathematics
- 2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- 3) an ability to communicate effectively with a range of audiences
- 4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- 5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- 6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- 7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Civil Engineering Program Criteria (2019-2020)

Curriculum: The curriculum must prepare graduates to apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, **and at least one additional area of basic science; apply**

probability and statistics to address uncertainty; analyze and solve problems in **at least four technical areas** appropriate to civil engineering; conduct experiments in **at least two technical areas** of civil engineering and analyze and interpret the resulting data; design a system, component, or process in at least two civil engineering contexts; **include principles of sustainability in design**; explain basic concepts in **project management, business, public policy, and leadership**; analyze issues in **professional ethics**; and explain the importance of **professional licensure**.

Faculty: The program must demonstrate that faculty teaching courses that are primarily design in content are **qualified** to teach the subject matter by virtue of **professional licensure**, or by **education** and **design experience**. The program must demonstrate that it is **not critically dependent on one individual**.

Civil Engineering Program Educational Objectives (PEOs)

Graduates from the Civil Engineering program will:

1. Have careers in civil engineering or related fields that lead to increasing levels of responsibility and leadership
2. Obtain professional licensure/certifications
3. Complete graduate studies in civil engineering or related fields
4. Engage in professional development and service

Mapping of Program Educational Objectives onto Student Outcomes

PEO	Program Educational Objectives	CE Student Outcomes						
	<i>Graduates from the Civil Engineering program will:</i>	[1]	[2]	[3]	[4]	[5]	[6]	[7]
PEO 1	Have careers in civil engineering or related fields that lead to increasing levels of responsibility and leadership	X	X	X	X	X	X	X
PEO 2	Obtain professional licensure/certifications	X	X					
PEO 3	Complete graduate studies in civil engineering or related fields	X	X	X	X		X	X
PEO 4	Engage in professional development and service	X	X	X	X		X	X

Mapping of CE Courses and Student Outcomes

Previous Course No.	New Course No.	Course Title	CE Student Outcomes/SOs						
			[1]	[2]	[3]	[4]	[5]	[6]	[7]
CVEG 1011	CVEG 1101	Introduction to Engineering							
CVEG 1021	CVEG 1102	Introduction to Civil Engineering Lab							I
CVEG 2043	CVEG 2301	Engineering Mechanics I							I
CVEG 2061	CVEG 2101	Materials & Dynamics Lab						I	
CVEG 2063	CVEG 2332	Mechanics of Materials I		I					
CVEG 2073	CVEG 2304	Global Development Issues {CORE}			I	√	I		R
CVEG 2081	CVEG 2102	Surveying & Geospatial Concepts			R			I	
CVEG 3023	CVEG 3300	Geotechnical Engineering		I					
CVEG 3031	CVEG 3100	Concrete & Steel Lab						√	
CVEG 3043	CVEG 3301	Environmental Engineering			R			√	
CVEG 3051	CVEG 3102	Professional Engineering I				√			
CVEG 3053	CVEG 3302	Transportation Engineering			R		√		
CVEG 3063	CVEG 3303	Hydraulics			√		R	√	
CVEG 3073	CVEG 3304	Structural Analysis I	I						√
CVEG 3083	CVEG 3305	Steel Design	√	√	R				
CVEG 4013	CVEG 4300	Reinforced Concrete	R	√					
CVEG 4021	CVEG 4100	Geotech Engineering Design Lab		R					√
CVEG 4043	CVEG 4301	Environmental Engineering Design	√	√	R				
CVEG 4053	CVEG 4302	Transportation Engineering Design	√				√		
CVEG 4063	CVEG 4303	Water Resources Engineering	√	√					I
CVEG 4093	CVEG 4304	Systems Engineering		√					√
CVEG 4472	CVEG 4200	Sr. Design & Professionalism I		√	√	√	√		√
CVEG 4482	CVEG 4201	Sr. Design & Professionalism II	√	√	√	√			

I – means the described outcome is introduced (not measured) but could be monitored.

√ - means that the skills described in the program outcome are covered and **measured** in the course.

R – means the described outcome is reinforced in the course (not measured) but could be monitored.

Additionally, evidence are to collected to satisfy **CE Program Criteria** covering basic concepts in **Management** (CVEG 3302, 4302, 4200, 4201, 4304), **Business** (CVEG 4304, 4200, 4201), **Public Policy** (CVEG 2304, 4200, 4201), **Professional Ethics** (CVEG 1102, 2304, 3102), Leadership (CVEG 4200, 4201), **Consideration of Sustainability** (CVEG 4301, 4302, 4303), **Importance of Professional Licensure** (CVEG 3102, 4200, 4201).

The Assessment Process

Student Learning outcomes are measured using both **direct** and **indirect** measurements. Direct measurement is derived from either designated homework, tests, lab reports project reports or other assignments. Indirect

measurement is drawn from end-of-semester Student Opinion Surveys (SOS) and any surveys completed by graduating Seniors. The above listed Student Learning Outcomes (Program Outcomes) are measured and evaluated in specified cycles and an Assessment Report is prepared annually for the purposes of continuously improving the Program's learning outcomes.

Major Course Requirements

Method of Determining Final Course Grade

Course Grade Requirement	Value	Total
1) Class Participation and quizzes	10%	10
2) Homework	15%	15
3) 3 Tests @ 15% Each	45%	45
4) Final Exam (Comprehensive)	20%	20
5) Project	10%	10
Total:	100%	100

Grading Criteria and Conversion:

A = 90-100
 B = 80-90
 C = 70-80
 D = 60-70
 F = 0-59

3 REPEAT RULE:

Any student in the College of Engineering, who has already taken the course at PVAMU three times (which is the maximum limit), will not be permitted to enroll that same course at PVAMU.

Semester Calendar
M- Monday and W- Wednesday

Week	Description
Week One: Topic Description Readings: Assignment (S):	Couse introduction M- Chapter 1 W- Concrete and Reinforced Concrete W- HW#1 Prerequisite Review
Week Two: Topic Description Readings: Assignment (S):	Concrete Properties and Loads M- Concrete Properties W- Loads on Structures W- HW#2 on Concrete Properties
Week Three: Topic Description Readings: Assignment (S):	Flexural Analysis of Beams M- Cracking Moment W- Ultimate Moment and ACI Code W- HW#3 on Flexural Analysis
Week Four: Topic Description Readings: Assignment (S):	Strength Analysis of Beams M- Strength Analysis of Beams W- Design of Beams W- HW#4 on Beams
Week Five: Topic Description Readings: Assignment (S):	Design of Slabs M- Design of Slabs (Cantilever and Continuous Slabs) W- Test on Chapters 1, 2 and 3 W- Test # 1
Week Six: Topic Description Readings: Assignment (S):	T Beams and Doubly Reinforced Beams M- T beams Design W- Doubly Reinforced Beams W- HW#5 on Chapter 4
Week Seven: Topic Description Readings: Assignment (S):	Serviceability M- Deflection W- Cracks W- HW#6
Week Eight: Topic Description Readings: Assignment (S):	Bond and Development Lengths M- Bond Stresses W- Development Lengths for Tension W- Test # 2 Midterm Exam
Week Nine: Topic Description Shear and Diagonal Tension Readings: Assignment (S):	M- Shear Strength of Concrete W- Shear Design W- HW# 7

Week Ten: Topic Description	Introduction to Columns
Readings:	M- Axial Load Capacity of Columns W- Column Design
Assignment (S):	W- HW # 8
Week Eleven: Topic Description	Columns with Bending
Readings:	M- Interaction Diagrams W- Design of Columns with Axial Load and Bending
Assignment (S):	W- HW # 9
Week Twelve: Topic Description	Slender Columns
Readings:	M- Slender Effects W- Sway Frames
Assignment (S):	W- HW # 10
Week Thirteen: Topic Description	Footings
Readings:	M- Wall Footings W- Wall Footings Design
Assignment (S):	W- HW# 11
Week Fourteen: Topic Description	Column Footings
Readings:	M- Column Square Footings W- Design of Square Footings
Assignment (S):	W- Test # 3
Week Fifteen: Topic Description	Rectangular and Combined Footings
Readings:	M- Rectangular Footings W- Combined Footings
Assignment (S):	W- HW# 12
Week Sixteen: Topic Description	Comprehensive Final Exam

Project Report due Date: December 1, 2021

CONTENT:

Engineering Design: 100% 3 Credits

Course Procedures and or Additional Instructor Policies

1. Class attendance is a requirement for the course.
2. Student absent or late for four or more classes may receive a failing grade.
3. Homework, projects, or reports must be turned in at the beginning of class on the due date.
4. Quiz may be given on any day without prior announcement.
5. No make-up quiz, test or examination will be given. If you miss a test/examination, you will receive zero credit for that test. If you have an excused absence, notify the instructor ahead of time.

6. Cell phones must not be used during class period, tests and exams.

HOMEWORK:

All assignments must be submitted to complete the course.

The following areas will be graded:

1. Completeness: Did you work all parts of the assignments?
2. Accuracy: Did you get the "correct" answer and indicate the units?
3. Format and Neatness: Is your presentation of the solution easy to follow, legible and in a professional manner?

Taskstream

Taskstream is a tool that Prairie View A&M University uses for assessment purposes. At least one of your assignments is **REQUIRED** to be submitted as an "artifact," an item of coursework that serves as evidence that course objectives are met. More information will be provided during the semester, but for general information, you can visit Taskstream via the link in canvas (ecourse).

POLICY TO ERADICATE CHEATING (PROTECT INTEGRITY OF EXAMS)

Cheating is unprofessional, unethical and is antithetical to our core value of "Excellence in Civil Engineering Education," and WILL NOT BE TOLERATED at any level. To combat this serious problem, the Civil & Environmental Engineering (CEE) Department has adopted the following rules to eradicate cheating.

- If a student cheats on a test/assignment, the student shall receive an **automatic zero** for the test/assignment.
- A student who has been determined to have cheated in a course will IMMEDIATELY relinquish his/her leadership position in any of the department's professional organizations.
- If a student cheats multiple times in a course, the student will receive a **grade of "F"** for the course.
- The calculators allowed for use in exams is **restricted** to the **latest** FE-approved calculators. For the latest NCEES FE approved calculators visit ncees.org or <https://ncees.org/exams/calculator/>
[This NCEES policy protects the integrity of NCEES exams and has been adopted to do likewise for department's exams.]

EXAM GUIDELINES (Faculty should consider adopting these for all exams)

- 1) All cellphones/smartwatches **MUST** be placed in a book bags during exams and turned off. Book bags **MUST** be placed in front of the classroom and away from students. Students without a book bag must place cellphone/smartwatch (turned off) on Instructor's desk – **no exceptions**
- 2) Any student possessing a cellphone/smartwatch or any other unauthorized device **WILL** receive an **automatic zero for the test/assignment**. This is cheating.
- 3) **Calculator covers** are **DISALLOWED** during tests and must be placed in students' book bags during exams.
- 4) There shall be **NO SHARING** of resources during the exam
- 5) **Restroom Visit**: if you need to use the restroom, do so before opening the exam. Once the exam begins, you must submit your work to the instructor if you leave the classroom to visit the restroom (your exam terminates)

Student Support and Success

John B. Coleman Library

The John B. Coleman Library's mission is to enhance the scholarly pursuit of knowledge, to foster intellectual curiosity, and to promote life-long learning and research through our innovative services, resources, and cultural programs, which support the Prairie View A&M University's global mission of teaching, service, and research. It maintains library collections and access both on campus, online, and through local agreements to further the educational goals of students and faculty. Website: <https://www.pvamu.edu/library/>; Phone: 936-261-1500

Academic Advising Services

Academic Advising Services offers students a variety of services that contributes to student success and leads towards graduation. We assist students with understanding university policies and procedures that affect academic progress. We support the early alert program to help students get connected to success early in the semester. We help refer students to the appropriate academic support services when they are unsure of the best resource for their needs. Faculty advisors support some students in their respective colleges. Your faculty advisor can be identified in PantherTracks. Advisors with Academic Advising Services are available to all students. We are located across campus. Find your advisor's location by academic major at www.pvamu.edu/advising. Phone: 936-261-5911

The University Tutoring Center

The University Tutoring Center (UTC) offers free tutoring and academic support to all registered PVAMU students. The mission of the UTC is to help provide a solid academic foundation that enables students to become confident, capable, independent learners. Competent and caring staff and peer tutors guide students in identifying, acquiring, and enhancing the knowledge, skills, and attitudes needed to reach their desired goals. Tutoring and academic support are offered face-to-face in the UTC, in virtual face-to-face sessions (<https://www.pvamu.edu/student-success/sass/university-tutoring-center/>), and through online sessions (<https://www.pvamu.edu/pvplace/>). Other support services available for students include Supplemental Instruction, Study Break, Academic Success Workshops, and Algebra Study Jam. Location: J. B. Coleman Library, Rm. 307; Phone: 936-261-1561; Email: pv tutoring@pvamu.edu; Website: <https://www.pvamu.edu/student-success/sass/university-tutoring-center/>

Writing Center

The Writing Center provides well-trained peer tutors to assist students with writing assignments at any stage of the writing process. Tutors help students with various writing tasks from understanding assignments, brainstorming, drafting, revising, editing, researching, and integrating sources. Students have free access to Grammarly online writing assistance. Grammarly is an automated proofreading and plagiarism detection tool. Students must register for Grammarly by using their student email address. In addition, students have access to face-to-face and virtual tutoring services either asynchronously via email or synchronously via Zoom. Location: J. B. Coleman Library, Rm. 209; Phone: 936-261-3724; Website: <https://www.pvamu.edu/student-success/writing-center/>; Grammarly Registration: <https://www.grammarly.com/enterprise/signup>

Academic Early Alert

Academic Early Alert is a proactive system of communication and collaboration between faculty, academic advisors, and PVAMU students that is designed to support student success by promptly identifying issues and allowing for intervention. Academic Early Alerts help students by providing a central location to schedule advising appointments, view advisor contact information, and request assistance. Students who recognize that they have a problem that is negatively affecting their academic performance or ability to continue school may self-refer an Academic Early Alert. To do so, students will log in to PV Place and click on Academic Early Alert on the left sidebar. Phone: 936-261-5902; Website: <https://www.pvamu.edu/student-success/early-alert/>

Student Counseling Services

The Student Counseling Services unit offers a range of services and programs to assist students in maximizing their potential for success: short-term individual, couples, and group counseling, as well as crisis intervention, outreach, consultation, and referral services. The staff is licensed by the State of Texas and assists students who are dealing with academic skills concerns, situational crises, adjustment problems, and emotional difficulties. Information shared with the staff is treated

confidentially and in accordance with Texas State Law. Location: Hobart Taylor, 2nd floor; Phone: 936-261-3564; Website: <https://www.pvamu.edu/healthservices/student-counseling-services/>

Office of Testing Services

Testing Services serves to create opportunities by offering a suite of exams that aid in the students' academic and professional success. Currently, we administer entrance (HESI A2), college readiness (TSI assessment), Prior Learning (CLEP, DSST), and proctored exams. Location: Wilhelmina Delco, 3rd Floor, Rm. 305; Phone: 936-261-3627; Email: aetesting@pvamu.edu; Website: www.pvamu.edu/testing

Office of Diagnostic Testing and Disability Services

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, contact the Office of Disability Services. As a federally-mandated educational support unit, the Office of Disability Services serves as the repository for confidential disability files for faculty, staff, and students. For persons with a disability, the Office develops individualized ADA letters of request for accommodations. Other services include learning style inventories, awareness workshops, accessibility pathways, webinars, computer laboratory with adapted hard and software, adapted furniture, proctoring non-standardized test administrations, ASL interpreters, ALDs, digital recorders, Livescribe, and a comprehensive referral network across campus and the broader community. Location: Hobart Taylor, Rm. 1D128; Phone: 936-261-3583; Website: <https://www.pvamu.edu/disabilityservices/>

Center for Instructional Innovation and Technology Services (CIITS)

Distance Learning, also referred to as Distance Education, is the employment of alternative instructional delivery methods to extend programs and services to persons unable to attend college in the traditional manner. The Center for Instructional Innovation and Technology Services (CIITS) supports student learning through online, hybrid, web-assist, and 2-way video course delivery. For more details and contact information, visit: <https://www.pvamu.edu/dlearning/distance-learning-2-2/students-2/>; Phone: 936-261-3283

Veteran Affairs

Veterans Services works with student veterans, current military and military dependents to support their transition to the college environment and continued persistence to graduation. The Office coordinates and certifies benefits for both the G.I. Bill and the Texas Hazlewood Act. Location: Evans Hall, Rm. 102; Phone: 936-261-3563; Website: <https://www.pvamu.edu/sa/departments/veteranaffairs/>

Office for Student Engagement

The Office for Student Engagement delivers comprehensive programs and services designed to meet the co-curricular needs of students. The Office implements inclusive and accessible programs and services that enhance student development through exposure to and participation in diverse and relevant social, cultural, intellectual, recreational, community service, leadership development, and campus governance. Location: Memorial Student Center, Rm. 221; Phone: 936-261-1340; Website: <https://www.pvamu.edu/studentengagement/>

Career Services

Career Services supports students through professional development, career readiness, and placement and employment assistance. The Office provides one-on-one career coaching, interview preparation, resume and letter writing, and career exploration workshops and seminars. Services are provided for students at the Northwest Houston Center and College of Nursing in the Medical Center twice a month or on a requested basis. Distance Learning students are encouraged to visit the Career Services website for information regarding services provided. Location: Anderson Hall, 2nd floor; Phone: 936-261-3570; Website: <https://www.pvamu.edu/careerservices/>

University Rules and Procedures

Academic Misconduct

Academic dishonesty is defined as any form of cheating or dishonesty that has the effect or intent of interfering with any academic exercise or fair evaluation of a student's performance. The college faculty can provide additional information, particularly related to a specific course, laboratory, or assignment.

You are expected to practice academic honesty in every aspect of this course and all other courses. Make sure you are familiar with the *University Administrative Guidelines on Academic Integrity*, which can be found on the [Academic Integrity webpage](#). Students who engage in academic misconduct are subject to university disciplinary procedures. As listed in the *University Administrative Guidelines on Academic Integrity*, the University Online Catalog, and the Student Code of Conduct, the following are examples of prohibited conduct. This list is not designed to be all-inclusive or exhaustive. In addition to academic sanctions, any student found to have committed academic misconduct that is also a violation of criminal law may also be subject to disciplinary review and action by the Office of Student Conduct (as outlined in the Student Code of Conduct).

Forms of Academic Dishonesty:

1. Cheating: Deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not learned, giving or receiving aid unauthorized by the instructor on assignments or examinations. Examples: unauthorized use of notes for a test; using a "cheat sheet" on a quiz or exam; any alteration made on a graded test or exam which is then resubmitted to the teacher;
2. Plagiarism: Careless or deliberate use of the work or the ideas of another; representation of another's work, words, ideas, or data as your own without permission or appropriate acknowledgment. Examples: copying another's paper or answers, failure to identify information or essays from the internet and submitting or representing it as your own; submitting an assignment which has been partially or wholly done by another and claiming it as yours; not properly acknowledging a source which has been summarized or paraphrased in your work; failure to acknowledge the use of another's words with quotation marks;
3. Collusion: When more than one student or person contributes to a piece of work that is submitted as the work of an individual;
4. Conspiracy: Agreeing with one or more persons to commit an act of academic/scholastic dishonesty; and
5. Multiple Submission: Submission of work from one course to satisfy a requirement in another course without explicit permission. Example: using a paper prepared and graded for credit in one course to fulfill a requirement and receive credit in a different course.

Nonacademic Misconduct

The university respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with either (1) the instructor's ability to conduct the class, (2) the inability of other students to profit from the instructional program, or (3) campus behavior that interferes with the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. The Office of Student Conduct will adjudicate such incidents under nonacademic procedures.

Sexual Misconduct

Sexual harassment of students and employees at Prairie View A&M University is unacceptable and will not be tolerated. Any member of the university community violating the university's sexual harassment policy will be subject to disciplinary action. In accordance with the Texas A&M University System guidelines, your instructor is obligated to report to the Office of Title IX Compliance (titleixteam@pvamu.edu) any instance of sexual misconduct involving a student, which includes sexual assault, stalking, dating violence, domestic violence, and sexual harassment, about which the instructor becomes aware during this course through writing, discussion, or personal disclosure. The faculty and staff of PVAMU actively strive to provide a learning, working, and living environment that promotes respect that is free from sexual misconduct, discrimination, and all forms of violence. If students, faculty, or staff would like assistance or have questions, they may contact the Title IX Coordinator at 936-261-2144 or titleixteam@pvamu.edu. More information can be found at www.pvamu.edu/titleix, including confidential resources available on campus.

Pregnancy, Pregnancy-related, and Parenting Accommodations

Title IX of the Education Amendments of 1972 prohibits sex discrimination, which includes discrimination based on pregnancy, marital status, or parental status. Students seeking accommodations related to pregnancy, pregnancy-related conditions, or parenting (reasonably immediate postpartum period) are encouraged to contact Student Disability Services or the Dean of Students' Office for additional information and to request accommodations.

Non-Discrimination Statement

Prairie View A&M University does not discriminate on the basis of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, sexual orientation, or gender identity in its programs and activities. The University is committed to supporting students and complying with The Texas A&M University System non-discrimination policy. It seeks to establish an environment that is free of bias, discrimination, and harassment. If you experience an incident of discrimination or harassment, we encourage you to report it. If you would like to speak with someone who may be able to afford you privacy or confidentiality, there are individuals who can meet with you. The Director of Equal Opportunity & Diversity has been designated to handle inquiries regarding the non-discrimination policies and can be reached at Harrington Science Building, Suite 109 or by phone at 936-261-1744 or 1792.

Class Attendance Policy (See the University Online Catalog for Full Attendance Policy)

Prairie View A&M University requires regular class attendance. Attending all classes supports the full academic development of each learner, whether classes are taught with the instructor physically present or via distance learning technologies such as interactive video and/or the internet. Excessive absenteeism, whether excused or unexcused, may result in a student's course grade being reduced or in the assignment of a grade of "F." Absences are accumulated beginning with the first day of class during regular semesters and summer terms. Each faculty member will include the University's attendance policy in each course syllabus.

Student Academic Appeals Process

Authority and responsibility for assigning grades to students rest with the faculty. However, in those instances where students believe that miscommunication, errors, or unfairness of any kind may have adversely affected the instructor's assessment of their academic performance, the student has a right to appeal by the procedure listed in the University Online Catalog and by doing so within thirty days of receiving the grade or experiencing any other problematic academic event that prompted the complaint.

Technical Considerations

Minimum Recommended Hardware and Software:

- Intel PC or Laptop with Windows 10 or later version; Mac with OS High Sierra*
- Smartphone or iPad/Tablet with Wi-Fi*
- High-speed Internet access
- 8 GB Memory
- Hard drive with 320 GB storage space
- 15" monitor, 800x600, color or 16 bit
- Sound card w/speakers
- Microphone and recording software
- Keyboard & mouse
- Most current version of Google Chrome, Safari, or Firefox

Note: Be sure to enable Java & pop-ups in the Web browser preferences

* Smartphones, Google Chrome books, and Android tablets may not be supported. iPads are the only tablets supported.

Participants should have a basic proficiency of the following computer skills:

- Sending and receiving email
- A working knowledge of the Internet
- Microsoft Word (or a program convertible to Word)
- Acrobat PDF Reader
- Windows or Mac OS

- Video conferencing software

Netiquette (online etiquette)

Students are expected to participate in all discussions and virtual classroom chats as directed. Students are to be respectful and courteous to others on discussion boards. Foul or abusive language will not be tolerated. Do not use ALL CAPS for communicating to others AS IT CAN BE INTERPRETED AS YELLING. Avoid slang terms such as "wassup?" and texting abbreviations such as "u" instead of "you." Limit and possibly avoid the use of emoticons. Be cautious when using humor or sarcasm as tone is sometimes lost in an email or discussion post, and the message might be taken seriously or sound offensive.

Video Conferencing Etiquette

When using Zoom, WebEx, or other video conferencing tools, confirm the visible area is tidy, clear of background clutter, inappropriate or offensive posters, and other distractions. Ensure you dress appropriately and avoid using high traffic or noisy areas. Stay muted when you are not speaking and avoid eating/drinking during the session. Before the class session begins, test audio, video, and lighting to alleviate technology issues.

Technical Support

Students should go to <https://mypassword.pvamu.edu/> if they have password issues. The page will provide instructions for resetting passwords and contact information if login issues persist. For other technical questions regarding eCourses, call the Center for Instructional Innovation and Technology Services at 936-261-3283 or email ciits@pvamu.edu.

Communication Expectations and Standards

Emails or discussion postings will receive a response from the instructor, usually in less than 48 hours. Urgent emails should be marked as such. Check regularly for responses.

Discussion Requirement

Online courses often require minimal to no face-to-face meetings. However, conversations about the readings, lectures, materials, and other aspects of the course can occur in a seminar fashion. The use of the discussion board will accomplish this. The instructor will determine the exact use of discussion boards.

It is strongly suggested that students type their discussion postings in a word processing application such as Word and save it to their PC or a removable drive before posting to the discussion board. This is important for two reasons: 1) If for some reason your discussion responses are lost in your online course, you will have another copy; 2) Grammatical errors can be greatly minimized by the use of the spell-and-grammar check functions in word processing applications. Once the post(s) have been typed and corrected in the word processing application, copy and paste to the discussion board.

COVID-19 Campus Safety Measures

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, PVAMU has adopted policies and practices to limit virus transmission.

- **Self-monitoring** - Students should follow CDC recommendations for self-monitoring. Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely and should not participate in face-to-face instruction.
- **Face Coverings** - Face coverings (cloth face covering, surgical mask, etc.) are recommended in classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource, and support offices, and outdoor spaces where 6 feet of physical distancing is challenging to maintain reliably.
- **Physical Distancing** - Physical distancing should be maintained between students, instructors, and others in course and course-related activities where possible.

- **Personal Illness and Quarantine** - Students required to quarantine are to participate in courses and course-related activities remotely and must not attend face-to-face course activities. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities. Students experiencing personal injury or illness that is too severe for the student to attend class qualify for an excused absence. To receive an excused absence, students must provide appropriate documentation to the Office for Student Conduct, studentconduct@pvamu.edu.

End of Semester Course Assessment Report

This summary contains the following Information

1. Performance Statistics

- Total number of students in class
- The class average performance (**stated as %**) in each course outcome assessed in this class and the **two previous times course was assessed**.
- The acceptable class average for the class in each outcome area as set by your Department. **You cannot use any number of your choice**
- Percentage of students who scored below the expected average in each outcome.

2. Implementation Summary

- Brief summary of plans implemented during the semester based on last assessment report

3. Perceived Problems

- Instructor's **critical evaluation** of perceived problems that affected students' performance. **Realistic problems should be identified throughout the semester and summarized in this section of the report.**

4. New Plans for Addressing Problems

- Instructor's plans for addressing the perceived problems the next time the class is taught. **These should be specific enough for another instructor to implement. Most of these should be things that, you, the instructor can implement to help students to improve. Be creative.**

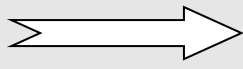
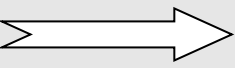
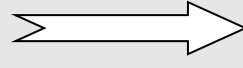
5. Overall Trend over last three assessment periods

- Instructors summary of overall performance trend for each outcome measured over the last three periods.

END OF SEMESTER COURSE OUTCOME ASSESSMENT REPORT
CVEG 4300 REINFORCED CONCRETE
FALL 2021 SEMESTER

Report Prepared by: Dr. R. Radhakrishnan

Report Date: December 20, 2021

Semester	Analysis Type	Number of Students	Outcome 2		
			Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.		
			Expected Average	Class Average	% Meeting Expected Average
Fall 2021	Direct	15*	70	75	80
Fall 2020	Direct	18*	70	86	94
Fall 2019	Direct	21	70	76	81
Implementation Summary			Emphasized the important basics, and knowledge required of Mechanics of Materials and structural Analysis for 2 weeks at the beginning of the semester. Special problems were assigned to students to help their understanding and to develop their skills to calculate SF and BM values and diagrams. Design examples in slab, beam, column and footing were worked in class and related assignments were given.		
Perceived Problems			The problem as observed in previous years continued in understanding and computing shear force and bending moment for single span, simple support and cantilever conditions. Faculty addressed this weakness existed in students by giving additional home works and a project assignment, and reemphasizing the engineering methods of reinforced concrete design.		
Plans for Addressing Problems			The following is recommended for implementation: In the future, the instructor may continue to review and assign problems to increase student understanding and methods of calculating support reactions and drawing SFD and BMD. To improve student skills on topics of Mechanics of Materials, instructor may give a list of pre-requisite topics and assign more homework problems. Continue to encourage students to do their assignments early and ask their instructor about how to apply methods and solve design problems before submitting their assignments.		
Overall Trend over Periods			Overall performance of students evaluation under the current ABET criterion during fall 2021 was found to be good. Even though the class average is equal to the just higher than that the expected average, further improvements to enhance student performance in future semesters will have to be pursued.		
Were Expectation Met			YES		

*Number of students who completed the course

**Grade Sheet Showing
Student and Class Performance in Outcomes**

**Grade Sheet Showing Class Performance
in Course Outcomes
CVEG 4300 Reinforced Concrete**

Fall 2021 CVEG 4300

	NAME	Assmt
		HW
	Criterion 2	5
		100
1		85
2		91
3		85
4		81
5		89
6		95
7		85
8		81
9		81
10		0
11		70
12		81
13		69
14		60
15		85
	Average	76

**OUTCOME SPECIFIC ASSIGNMENTS
USED TO ASSESS OUTCOMES**

ASSIGNMENTS FOR OUTCOME “2”

Ability to ability to apply engineering design to produce solutions that meet specified needs

(As it relates to Reinforced Concrete)

An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factor

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING
CVEG 4300 Reinforced Concrete
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET

FALL 2021

Instructor: Dr. R. Radha

Title of Assignment

Design of a reinforced concrete slab and beam

Outcome Measured Using this Assignment

Outcome 2

An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factor

Check the engineering design characteristics related to this assignment

X	Involves identifying the specific needs to be met by defining/understanding the problem and developing plans for the project to satisfy the need
	Involves conducting a review of the literature and performing preliminary design by generating alternative ideas/solutions and applying creativity
	Involves performing detailed engineering design leading to specification and fabrication/selection of components for system being designed.
	Involves consideration of one or more of the following (Please check those involved in this assignment.)
	☐ Public health
	X ☒ Safety and welfare
	☐ Global factors
	☐ Cultural factors
	☐ Social factors
	☐ Environmental factors
	☐ Economic factors
	Involves fabrication and testing of model or prototype

Brief justification of the suitability of assignment for the outcome

The assignment is selected to develop in students the ability to design a system and components to meet the desired strength using reinforced concrete material to support loads on a slab and beam.

CVEG 4300 Reinforced Concrete FALL 2021

ASSIGNMENT STATEMENT/QUESTIONS :

Design of a reinforced concrete slab and beam

GRADING SCHEME FOR ASSIGNMENT:

General outline and Report Content

Front page

Course Name

Student Name

Assignment Title

CONTENTS

- | | |
|--|-------------|
| 1) Assignment statement and objective | (5 points) |
| 2) Plan of the structure showing slab and beam layout | (5 points) |
| 3) Sectional elevation | (5 points) |
| 4) Slab design | (30 points) |
| Load, BM, Calculation details, results etc. | |
| 5) Beam design | (30 points) |
| Load, SF, BM, Calculation details, results etc. | |
| 6) Sketches of slab and beam with dimensions and reinforcement details | (25 points) |

TOTAL = 100 Pts

OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET

CVEG 4300-REINFORCED CONCRETE

Instructor: Dr. Radha

Title of Assignment

Homework

Outcome Measured Using this Assignment

Outcome 2

An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factor

Brief justification of the suitability of this assignment for the outcome

The questions in the homework are selected to develop in students the ability to design a system, component or to meet the desired needs using reinforced concrete material calculating loads for analysis and strength of a beam and design of a beam.

Civil & Environmental
Engineering Department
PRAIRIE VIEW A&M UNIVERSITY



CVEG 4300-P01
Reinforce Concrete
Fall 2021
Homework #5
Submitted By: Autumn Carter
Due Date: September 25, 2021 at
11:59pm

Why does the ACI Code specify that a certain minimum Percentage of reinforcing be used in beams?

If the beam is lightly reinforced or over reinforced failure can occur. When the cracking moment is greater its ultimate resisting moment, the beam will immediately fail w/o any warning. To avoid this kind of failure, ACI specifies a minimum amount of reinforcement for every section of flexural members.

Formula for min amount of flexure reinforcement in Percentage $P_{min} = \frac{3\sqrt{f_c'}}{f_y} \geq \frac{200}{f_y}$

Web width of beams

The effective flange width, b_f applies to T beams and includes the width of the web plus the effective overhanging flange width

$$A_{smin} = \frac{3\sqrt{f_c'}}{f_y} b_w d$$

$$\text{not less than } \frac{200b_w d}{f_y}$$

Problem 3.5

Distinguish b/t tension-controlled & compression-controlled beams

Tension Controlled Beams

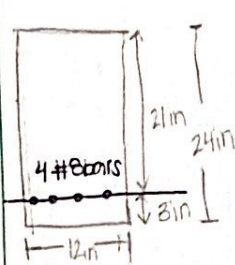
- Ductile Members.
- Deflections will be large and will give warning of failure.
- Failure happens b/c of yielding of steel in which tensile strain is ≥ 0.005 .
- Steel fails before concrete reaches its max. strength.

Compression Controlled Beams

- o Brittle Members
- o Deflection will not be noticeable and failure will occur w/o warning.
- o Strain in concrete fibers reaches yield strain, which is equal to 0.003.
- o Concrete fails before steel b/c of over reinforcement.

Problem 3.7

Determine the values of ϵ_t , ϕ , and ϕM_n for the sections shown



$$f_y = 75000 \text{ psi}$$

$$f_c' = 5000 \text{ psi}$$

#8 cross sectional area (Appendix A Table A.2)
 $\#8 = 0.79 \text{ in}^2$

$$A_s = (4)(0.79 \text{ in}^2) = 3.16 \text{ in}^2$$

$$\rho_{\text{actual}} = \frac{A_s}{b d} = \frac{3.16 \text{ in}^2}{(12)(21)} = 0.0125$$

$$\rho_{\min} = \frac{3\sqrt{f_c'}}{f_y} + \frac{200}{f_y}$$

$$\frac{3\sqrt{5000}}{75000} = 0.0028 + \frac{200}{75000} = 0.0026$$

↑
larger

$$\rho_{\min} = 0.0028$$

$$\rho_{\max} = 0.0243$$

$$\rho > \rho_{\min}$$

$$\rho < \rho_{\max}$$

$$a = \frac{A_s f_y}{0.85 f_c' b} = \frac{(3.16 \text{ in}^2)(75000 \text{ psi})}{(0.85)(5000 \text{ psi})(12 \text{ in})} = 4.6 \text{ in}$$

$$C = \frac{a}{\beta_1} \quad \beta_1 = \frac{5000 \text{ psi}}{P_1 = 0.8} \quad C = \frac{4.6 \text{ in}}{0.8} = 5.8 \text{ in}$$

$$\text{Find } \epsilon_t = \frac{0.003}{5.8 \text{ in}} = \frac{\epsilon_t}{d - c} = \frac{(0.003)(21 - 5.8)}{5.8} = 0.0078$$

$$0.0078 > 0.005 \quad \text{use } \phi = 0.9$$

$$M_n = A_s f_y \left(d - \frac{a}{2} \right) = (3.16)(75) \left(21 - \frac{4.6}{2} \right) = 4425.97 \text{ in-k}$$

$$4425.97 \text{ in-k} \cdot \frac{1}{12} = 368.83 \text{ ft-k}$$

$$\phi M_n = (\phi)(M_n) = (0.9)(368.83) = 330.14 \text{ ft-k}$$

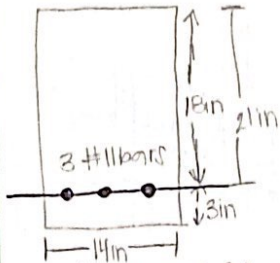
$$\epsilon_t = 0.0078$$

$$\phi = 0.9$$

$$\phi M_n = 330.14 \text{ ft-k}$$

Problem 3.8

Determine the values of E_t , ϕ and M_{in} for the sections shown



$$f_y = 75000 \text{ psi}$$

$$f_c' = 5000 \text{ psi}$$

#11 bar cross-sectional area
 1.66 in^2

Use Ruler to draw

$$A_s = (3)(1.66 \text{ in}^2) = 4.98 \text{ in}^2$$

$$\rho = \frac{A_s}{b d} = \frac{4.98}{(14)(18)} = 0.0196$$

$$\rho_{min} = \frac{3\sqrt{f_c'}}{f_y} + \frac{200}{f_y} = \frac{3\sqrt{5000}}{75000} + \frac{200}{75000}$$

$$= 0.00287 + 0.0026$$

$$\rho > \rho_{min}$$

$$\rho_{max} = 0.0243 > \rho$$

$$\eta = \frac{A_s f_y}{0.85 f_c' b d} = \frac{(4.98 \text{ in}^2)(75000 \text{ psi})}{(0.85)(5000 \text{ psi})(14 \text{ in})} = 5.9 \text{ in}$$

$$P_1 = 0.8$$

$$C = \frac{\eta}{P_1} = \frac{5.9}{0.8} = 7.38 \text{ in}$$

$$\text{find } E_t = \frac{18 - 7.38}{7.38} \cdot 0.003 = 0.00431$$

$$E_y = \frac{75000}{290000 \text{ ksi}} = 2.58 \times 10^{-3}$$

$$0.002 < E_t < 0.008$$

$$\phi = 0.65 + (E_t - 0.002) \cdot \left(\frac{0.25}{0.005 - 0.002} \right)$$

$$= 0.65 + (0.00431 - 0.002) \left(\frac{0.25}{0.005 - 0.002} \right) = 0.8425$$

$$M_{in} = (4.98)(75) \left(18 - \frac{5.9}{2} \right) = 5282.55 \text{ in-k} \quad \frac{1}{12} = 440.2 \text{ ft-k}$$

$$\phi M_{in} = (0.8425)(440.2) = 370.87 \text{ ft-k}$$

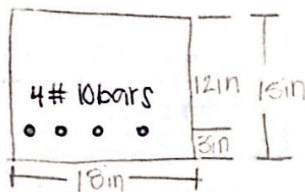
$$E_t = 0.00431$$

$$\phi = 0.8425$$

$$\phi M_{in} = 370.87 \text{ ft-k}$$

Problem 3.10

Determine the values of ϵ_t , ρ , and ρ_{min} for the sections shown



$f_y = 60000 \text{ psi}$
 $f'_c = 4000 \text{ psi}$
 Cross-Sectional area
 #10 bar
 1.27 in^2

$$A_s = (4)(1.27 \text{ in}^2) = 5.08 \text{ in}^2 \quad \rho_{min} = 0.0033$$

$$\rho = \frac{A_s}{b d} = \frac{5.08}{(18)(12)} = 0.023 \quad \rho_{max} = 0.0285$$

$$\rho = \frac{(5.08)(60000 \text{ psi})}{(0.85)(4000)(18 \text{ in})} = 4.98 \quad \rho_1 = 0.85$$

$$c = \frac{4.98}{0.85} = 5.85$$

$$\epsilon_t = \frac{(12 - 5.85)}{5.85} \cdot 0.003 = 0.00315$$

$$0.00315 < 0.004$$

Therefore, the net tensile strain is 0.00315 which is less than 0.004, so may not be used as per ACI Section 10.3.5.

Problem 3.4

Why does the ACI code specify that a certain minimum percentage of reinforcing be used in beams?

85/100

The ACI code specifies a minimum percentage to avoid sudden failure.

Find the reason on page 72 of the textbook

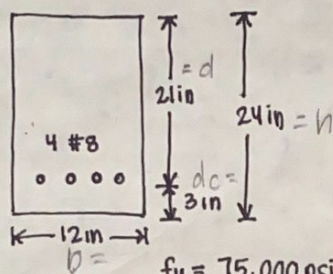
PROBLEM 3.5

Distinguish between tension-controlled and compression-controlled beams

For tension-controlled the deflection will be noticeable and would have a warning. For compression-controlled the deflection won't be as noticeable and have no warning. Compression controlled is brittle member while tension controlled is ductile.

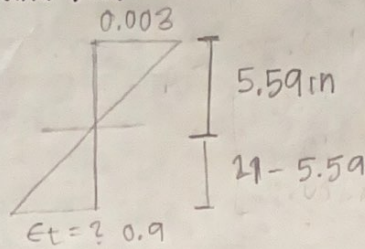
NOT readable

Write and scan better

PROBLEM 3.7Determine the values of ϵ_t , ϕ and ϕM_n 

$$f_y = 75,000 \text{ psi}$$

$$f'_c = 5000 \text{ psi}$$



$$\#8 (0.79 \text{ in}^2) 4 = 3.16 \text{ in}^2$$

$$\rho = \frac{A_s}{bd} = \frac{3.16 \text{ in}^2}{(12 \text{ in})(21 \text{ in})} = \frac{3.16 \text{ in}^2}{252 \text{ in}^2} = 0.012 > \rho_{\min} < \rho_{\max}$$

from Table A-7

$$\rho_{\min} = 0.0028$$

$$\rho_{\max} = 0.0181$$

$$\rho_{\max} = \frac{200}{75,000} = 0.00267 \quad \rho_{\min} = \frac{3\sqrt{5000}}{75,000} = 0.0028$$

$$a = \frac{A_s f_y}{0.85 f'_c b} = \frac{(3.16 \text{ in}^2)(75,000 \text{ psi})}{0.85(5000 \text{ psi})(12 \text{ in})} = 4.47 \text{ in}$$

$$\beta_1 = 0.85 - \left(\frac{5000 - 4000}{1000} \right) (0.05) = 0.80$$

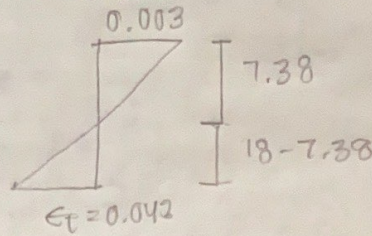
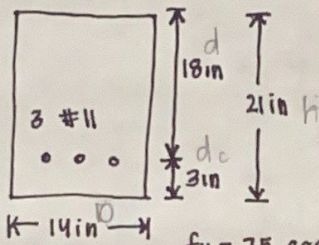
$$c = \frac{a}{\beta_1} = \frac{4.47}{0.80} = 5.59 \text{ in}$$

$$\frac{0.003}{5.59} = \frac{\epsilon_t}{21 - 5.59}$$

$$\epsilon_t = (0.003) \left(\frac{21 - 5.59}{5.59} \right) = \boxed{0.00827} > 0.005 \quad \text{use } \phi = \boxed{0.90}$$

$$\phi M_n = 0.9 (3.16 \text{ in}^2) (75 \text{ ksi}) \left(21 - \frac{4.47}{2} \right) \left(\frac{1}{12} \right)$$

$$\boxed{330 \text{ k-ft}}$$

PROBLEM 3.8Determine the values of ϵ_t , ϕ and ϕM_n 

$$f_y = 75,000 \text{ psi}$$

$$f'_c = 5000 \text{ psi}$$

Table A-2

$$\#11 \quad 3(1.56 \text{ in}^2) = 4.68 \text{ in}^2$$

$$\rho = \frac{A_s}{bd} = \frac{4.68 \text{ in}^2}{(14 \text{ in})(18 \text{ in})} = 0.0186 > \rho_{min} (0.0028) \leftarrow \frac{3\sqrt{5000}}{75000}$$

$$< \rho_{max} (0.024)$$

$$a = \frac{A_s f_y}{0.85 f'_c b} = \frac{(4.68 \text{ in}^2)(75,000 \text{ psi})}{0.85(5000 \text{ psi})(14 \text{ in})} = 5.9 \text{ in}$$

$$\beta_1 = 0.85 \left(\frac{f'_c - 4000}{1000} \right) - 0.05 = 0.85 \left(\frac{5000 - 4000}{1000} \right) - 0.05 = 0.80$$

$$c = \frac{a}{\beta_1} = \frac{5.9}{0.8} = 7.38 \text{ in}$$

$$\epsilon_t = (0.003) \left(\frac{18 \text{ in} - 7.38 \text{ in}}{7.38 \text{ in}} \right) = 0.0043 \begin{cases} \leq 0.005 \\ > 0.004 \end{cases}$$

$$\phi = 0.05 + (\epsilon_t - \epsilon_{yt}) \left(\frac{0.25}{0.005 - \epsilon_{yt}} \right)$$

$$\epsilon_{yt} = \frac{75,000}{29 \times 10^6} = 0.00258$$

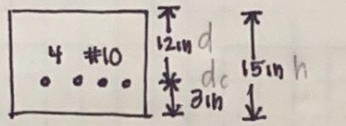
$$\phi = 0.05 + 0.25 \left(\frac{0.0043 - 0.00258}{0.005 - 0.00258} \right)$$

$$\boxed{\phi = 0.82}$$

 ϕM_n

$$(0.82)(4.68)(75) \left(18 - \frac{5.9}{2} \right) = 4331.09 \text{ k-in}$$

$$\boxed{360.97 \text{ k-ft}}$$

PROBLEM 3.10Determine the values of ϵ_t , ϕ and ϕM_n 

$$b = 18 \text{ in}$$

$$f_y = 60,000 \text{ psi}$$

$$f'_c = 4000 \text{ psi}$$

$$\#10 (1.27 \text{ in}^2) 4 = 5.08 \text{ in}^2$$

$$a = \frac{A_s f_y}{0.85 f'_c b} = \frac{(5.08 \text{ in}^2)(60,000 \text{ psi})}{0.85(4000 \text{ psi})(18 \text{ in})} = 4.98 \text{ in}$$

$$\beta_1 = 0.85$$

$$c = \frac{a}{\beta_1} = \frac{4.98 \text{ in}}{0.85} = 5.86 \text{ in}$$

$$\epsilon_t = 0.003 \left(\frac{12 - 5.86}{5.86} \right) = 0.0031 < 0.004$$

cant be used

THIS IS LAST PAGE OF THIS DOCUMENT