

SAMPLE ASSESSMENT REPORT

**ROY G. PERRY COLLEGE OF ENGINEERING
MECHANICAL ENGINEERING DEPARTMENT
PRAIRIE VIEW A&M UNIVERSITY**

ASSESSMENT REPORT COVER PAGE

MCEG 2053 ENGINEERING MECHANICS II

FALL 2020 SEMESTER

NAME OF INSTRUCTOR: Dr. April Lovelady

Revised: 08/05/2019

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- 3. End of Semester Outcomes Assessment Report (New Format)**
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- 5. Supporting Outcomes Specific Assignments (Minimum of 2 per outcome except for Project Reports where one is enough)**
 - 5.1 Assignments assessing students' 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. (outcome "2")
 - 5.2 Assignments assessing students' ability to identify, formulate, and solve complex engineering problems (CEP) by applying principles of engineering, science, and mathematics.
(Outcome 1)
 - 5.3 Assignments assessing students' ability to communicate effectively with a range of audiences (Oral & Written)

Detailed Course Syllabus
(Distributed to Students at the beginning of the Semester)
ABET Outcomes measured using course should be
explicitly listed in the syllabus

Course Description in ABET Format

MCEG 2053 Engineering Mechanics II

1.	Course number and name:	MCEG 2053 Engineering Mechanics II
2.	Credits and contact hours:	3 credit hours; 3 contact hours
3.	Instructor's or course coordinator's name:	Dr. April Lovelady
4.	Text book: Title:	Engineering Mechanics: Dynamics
	Author:	RC Hibbeler
	Publisher, Year & Edition:	Pearson, 2016, 14 th Edition
	a. Other Supplemental material	N/A
5.	Specific course information	
	a. Brief description of the content of the course (catalog description)	Kinematics and kinetics of particles and of rigid bodies as applied to engineering problems; Newton's laws of motion; work and energy; impulse and momentum; translations; rotation; plane motion; motion about a point; general motions; and periodic motions.
	b. Prerequisites or Co-requisites	CVEG 2043 None
	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. define a design problem and identify needs 2. generate & evaluate concepts 3. plan a project 4. research and gather information from several sources 5. use basic engineering principles to identify, formulate and solve complex engineering problems. 5. analyze, and select components for piping and duct systems, pumps, fans and heat exchangers 6. use basic engineering principles and design tools to design a Fluid- thermal system, component or process to meet a desired
	b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.	This course addresses: Outcome 1 Ability to identify, formulate, and solve complex engineering problems (CEP) by applying principles of engineering, science, and mathematics.

7	Brief list of topics to be covered	Kinematics of a Particle (5 hours) Kinetics of a Particle: Force and Acceleration (6 hours) Kinetics of a Particle: Work and Energy (5 hours) Kinetics of a Particle: Impulse and Momentum (5 hours) Planar Kinematics of a Rigid Body (5 hours) Planar Kinematics of a Rigid Body: Force and Acceleration (5 hours) Planar Kinematics of a Rigid Body: Work and Energy (4 hours) Planar Kinematics of a Rigid Body: Impulse and Momentum (4 hours) Three-Dimensional Kinetics of a Rigid Body (4 hours) Vibrations (2 hours)

Additional Course Syllabus Information

CLASS HOURS: Asynchronous
CLASS ROOM: N/A
OFFICE: Virtual
OFFICE HOURS: AS POSTED

CLASS PUNCTUALITY:

The class roll will be checked within the first five minutes of the class period. Anyone who comes in after the roll is checked will be considered late.

CHEATING AND PLAGIARISM

Students are referred to the University Policy about cheating and plagiarism. It shall be the policy in this course to discourage cheating to the extent possible, rather than to try to trap and to punish. On the other hand, in fairness to all concerned, **cheating and plagiarism will be treated severely wherever it is found.**

Because a large part of the learning experience comes from interaction with your peers, students are encouraged to discuss assignments with each other. The material submitted for grading must, however, be the product of individual or assigned group effort; anything else constitutes cheating.

DESIGN: This is a design course and students will be put into design groups. Group dynamics will be very important. Each group of students will be given two major design projects which will require the basic knowledge of thermodynamics, fluids, heat transfer, and functions, operations, selection and optimization of thermal equipment. A systematic approach to the design process will be essential. In addition to the two major projects each group will be tested on various component sizing and selection in the form of assignments.

REPORTS:

The mid-term reports & the final project reports should be completely typed in a formal report format to be discussed in class.

PROJECT ASSIGNMENT:

All project assignment should be handed in on the due date. You may submit them typed or neatly handwritten. Students are responsible for organizing themselves in order to complete the design project. Each student in the group shall be responsible for any and all details of the design project.

Table 1 Course Matrix Showing Outcomes covered in Various Courses

MCEG Courses	ABET EAC Criteria a-k							
	Fall 2018	Spring 19	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022
1021 Mech. Drawing & Desg.	2*	2*	2*	2*	2*	2*	2*	2*
2013 Thermodynamics I	1*	1*	1*	1*	1*	1*	1*	1*
2023 Materials Sci/Engr.	1*	1*	1*	1*	1*	1*	1*	1*
2053 Engineering Mechanics II	1*	1*	1*	1*	1*	1*	1*	1*
3011 Measurement Lab		6		6		6		6
3013 Heat Transfer	1		1		1		1	
3021 Thermal Sci. Lab	6	6	6	6	6	6	6	6
3023 Thermodynamics II	1	1	1	1	1	1	1	1
3031 Manufacturing Lab		2		2		2		2
3033 Manufacturing Proc								
3043 Machine Design I	2		2		2		2	
3053 Kinematic Design	1		1		1		1	
3063 Fluid Mechanics	1	6	1	6	1	6	1	6
4043 Machine Design II	2		2		2		2	
4063 Dynamic Systems		1		1		1		1
4093 Finite Element	1		1		1		1	
4472 Senior Project I	4, 5		4, 5		4, 5		4, 5	
4482 Senior Project II		2,3,7		2,3,7		2,3,7		2,3,7

Class Attendance Policy

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

NOTE: For this class, attendance will be taken at the beginning of class. After the first week of class, students will be marked present, absent, late or excused absence. Absent, late, and excessive excused absence will count negatively towards your grade by reducing your class percentage according to the formula below;

Absent = -1% per each class student is absent.

Late = -0.5% per each class student is late

Excused absence = -0.25% for each excused absence above 3 class periods (No penalty for first three excused absences). An excused absent will be given when accompanied by verifying records and approved by the course instructor

GRADING SUMMARY

Course Grade Requirement	Value	Total
1) Homework	5%	5
2) Quizzes	15%	15
3) Exams (3 Exams)	60%	60
4) Final Exam	20%	20
Total:	100%	100

POINTS

90 - 100%
80 - 89.9%
65 - 79.9%
55 - 64.9%
0 - 54.9%

GRADE

A
B
C
D
F

The sequencing of topics to be covered in this course has been carefully done to provide a logical transition from one topic to another. Each topic builds on the previous topics and students are encouraged to ensure thorough understanding of earlier topics to aid them to understand the new ones being introduced. The plan of course described below was designed with the above objectives in mind.

IMPORTANT DATES

Final Day to Drop/Withdraw from Course(s) without Academic Record (A Financial Record will still exist)	September 9, 2020
Withdrawal from Courses with Academic Record ("W") Begins	September 10, 2020
Drop for Non-Payment of Tuition and Fees @ 5:00 p.m.	September 15, 2020
Mid-Semester Examination Period	October 8 – 10, 2020
Final Date to Apply for Fall 2020 Graduation (ceremony participation)	October 29, 2020
Final Day to Withdraw from Course(s) with Academic Record ("W")	November 2, 2020
Thanksgiving Holiday (University Closed) "All classes move to remote learning after the Thanksgiving break"	November 26 – 27, 2020
Last Class Day	December 2, 2020
Final Exams	December 3 – 9, 2020
Final Grades Due for Graduation Candidates	December 10, 2020
Final Grades due for all other students	December 14, 2020

NOTE:

1. Please read the UNIVERSITY CLASS ATTENDANCE POLICY (undergraduate catalog, 2005-2007, pp. 111).
2. Please read the University Policy on Academic Honesty (undergraduate catalog, 2005-2007, pp. 111-116).

DISABILITY REQUIREMENTS:

Do you have any special needs in this class related to a disability? If yes, please contact your instructor as soon as possible. (Undergraduate Catalog, 2005-2007, p. 61) Any student who has, or believes they may have a disability that requires accommodations is advised to contact the Office of Students with Disabilities at 936-857-2610 in Evans Hall Room 315.)

ENERGY SYSTEMS DESIGN

FALL 2020

TENTATIVE CLASS SCHEDULE

Week	Lecture	Homework	Due Dates
1	Introduction & Course Outline		
	Calculus Review		
	Free Body Diagrams		
2	Labor Day Holiday		
	Section 12.1 - 12.3	Ch12 Homework Problems:	
	Section 12.4 - 12.5	2, 17, 52, 89, 118, 179, 207, 218	
3	Section 12.6 - 12.7		
	Section 12.8 - 12.9		
	<i>Hands-On Activity</i>		
4	Section 12.10/Chapter 12 Review		
	Section 13.3.1 - 13.2	Ch13 Homework Problems:	Chapter 12 Homework
	Section 13.3	7, 10, 61, 88	Chapter 12 Video Quiz
5	Section 13.4		Chapter 12 HW Quiz
	Section 13.5		
	Hands-On Activity		
6	Section 13.6		
	Section 14.1 - 14.2	Ch14 Homework Problems:	Chapter 13 Homework
	Section 14.3	1, 45, 66, 67, 77	Chapter 13 Concept Quiz
7	Section 14.4		Chapter 13 HW Quiz
	Section 14.5		EXAM 1
	Hands-On Activity		
8	Section 14.6		
	Section 15.1 - 15.2	Ch15 Homework Problems:	Chapter 14 Homework
	Section 15.3 - 15.4	1, 10, 35, 47, 60, 95	Chapter 14 Video Quiz
9	Section 15.5		Chapter 14 HW Quiz
	Section 15.6		
	Hands-On Activity		
10	Section 15.7		
	Section 16.1 - 16.2	Ch16 Homework Problems:	Chapter 15 Homework
	Section 16.3 - 16.4	1, 3, 43, 61, 91	Chapter 15 Concept Quiz
11	Section 16.5		Chapter 15 HW Quiz
	Section 16.6		EXAM 2
	Hands-On Activity		
12	Section 16.7		

	Section 17.1 - 17.2	Ch17 Homework Problems:	Chapter 16 Homework
	Section 17.3	13, 14, 15, 16, 17, 27, 57	Chapter 16 Concept Quiz
13	Section 17.4		Chapter 16 HW Quiz
	Section 17.5		
	Hands-On Activity		
14	Section 18.1 - 18.2	Ch18 Homework Problems:	Chapter 17 Homework
	Thanksgiving Holiday	4, 39	Chapter 17 Concept Quiz
	Section 18.3 - 18.4		Chapter 17 HW Quiz
15	Section 18.5		EXAM 3
	Sectoin 19.1 - 19.2	Ch19 Homework Problems:	Chapter 18 Homework
	Section 19.3	6, 50	
16	Section 22.1		
	Section 22.2		Chapter 19 Homework
	Final Exam Review		FINAL EXAM

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.

5. Were Expectations Met?

- Answer **YES** if the **class average was above the expected average** and the **stated percentage of students** scored at or above the expected average, else answer **NO**.

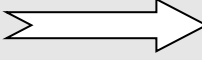
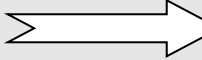
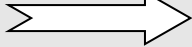
END OF SEMESTER COURSE OUTCOME ASSESSMENT REPORT

MCEG 2053 ENGINEERING MECHANICS II

FALL 2020 SEMESTER

Report Prepared by: Dr. April Lovelady

Report Date: December 21, 2020

Semester	Analysis Type	Number of Students	Outcome I The ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.			
			Expected Class Average	Expected Percent of students at or above average	Class Average	% Students meeting Expected Average
Spring 2020	Direct	24	70	70	-79	79
Fall 2020	Direct	21	70	70	47.7	33
Fall 2020	Direct	16	70	70	47.9	25
Implementation Summary	Items implemented from previous report or after meeting previous instructor 		Math review tutorials are posted as supplementary material. More exercises emphasizing on problem solving and calculation are discussed in the class.			
Perceived Problems	Perceived problems are directly related to the PC and the sub items under them 		Students struggled in some fundamental math problems. The ability of calculus varies drastically among students.			
Plans for Addressing Problems	Plans for address specific measures to address PC and their sub areas 		Math review (outside of classroom) and quizzes will help student review and improve their math capabilities relate to this course. More tutorial and exercises will be given to improve the students' ability of problem solving. Smaller class size helps the interaction during and after class.			
Overall Trend over Periods	Ascertain if there were improvements over previous semesters 		Class average does not meet the expected average. Percentage of students meeting the expected average is improving comparing with last semester.			
Were Expectations Met?	Class Average $\geq 70\%$ and $\geq 70\%$ of Students Performed at or Above Expected Average. 		NO			

**Grade Sheet Showing
Student and Class Performance in Outcomes
The computed semester average in each outcome
as stated in the Assessment report are
highlighted in boldface**

**OUTCOME SPECIFIC ASSIGNMENTS
USED TO ASSESS OUTCOMES**

(Provide at least two assignments used to specifically measure each outcome and justify the suitability of the assignments for the outcome being measured)

**MECHANICAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET
ENGINEERING MECHANICS II**

FALL 2020

Instructor: Dr. April Lovelady

Title of Assignment

EXAM 1

Outcome Measured Using this Assignment

Outcome 1

An ability to identify, formulate, and solve **complex engineering problems** by applying principles of engineering, science, and mathematic.

Check the complex engineering problem characteristics related to this assignment

Assignment problem	
	involves wide-ranging or conflicting technical issues,
	has no obvious solution
	Addresses problems not encompassed by current standards and codes
	involves diverse groups of stakeholders
X	includes many component parts or sub-problems
	involves multiple disciplines
	has significant consequences in a range of contexts
Assignment problem involves the application of the principles of	
X	engineering
	science
X	mathematics

Brief justification of why this assignment is suitable for this outcome

The questions on this section of Exam 1 tests the students ability to identify relevant laws and equations, formulate the solution methodology, and solve the resulting engineering equations in fluid systems

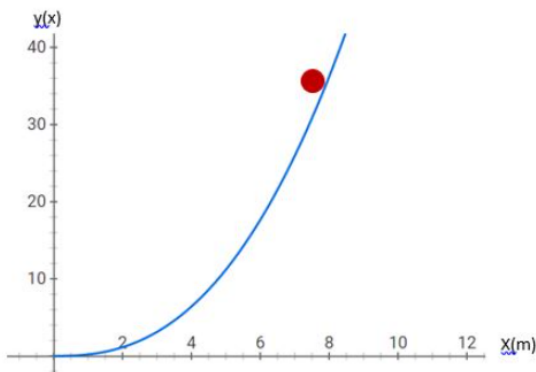
This exam consists of 2 problems with multiple parts. To be successful, it's important to demonstrate your knowledge of the engineering problem solving method as it applies to Engineering Mechanics. It will also be extremely useful to know the calculus concepts of integration and differentiation. Keep the following in mind:

- **Single Attempt** - You will have one attempt for this exam with that score being recorded in the grade book.
- **Timing** - You are allotted 60 minutes to complete this exam. Once 60 minutes has expired, the exam will close and your grade will be based on the work completed.
- **Engineering Problem Solving Method** - Please be sure to follow the engineering problem solving method and label each step. The steps are:
 - Givens
 - Find
 - Assumptions (If there are no assumptions, please write N/A)
 - Properties
 - Schematic/Free Body Diagram
 - Solution
- **Answers**- Will be provided only after everyone has completed the exam.

When finished, click the **"Submit Quiz"** button.

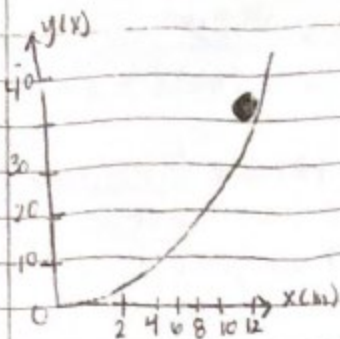
Only registered, enrolled users can take graded exams.

An object travels along a curved path whose function is described by $y = \frac{x^2}{5}$ at a velocity of 14 m/s and with an acceleration of 3.9 m/s^2 . Determine the direction of the objects velocity. Also determine the magnitude of its acceleration at 8m.



Taylor Davis

Exam 1 - Q2



Given: $y = \frac{x^{5/2}}{5}$ ✓

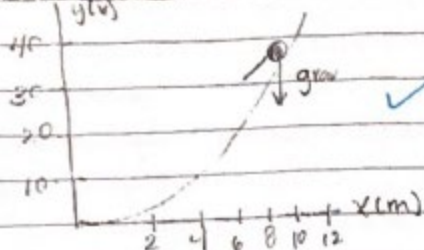
$V = 14 \text{ m/s} \rightarrow \text{velocity}$
 $\text{acceleration} = 3.9 \text{ m/s}^2$

Find: Direction of the objects
 Velocity
 Magnitude of acceleration
 at 8m

Assumptions: N/A ✓

Properties: $y = \frac{x^{5/2}}{5}$ ✓

Schematic:



Analysis:

i. direction of objects velocity

$y = \frac{x^{5/2}}{5}$

$\frac{dy}{dx} = \frac{5}{2} \cdot \frac{x^{5/2-1}}{5} = \frac{1}{2} x^{3/2}$

$\frac{d^2y}{dx^2} = \frac{1}{2} \cdot \frac{3}{2} \cdot x^{3/2-1} = \frac{3}{4} x^{1/2}$

$\frac{dy}{dx} = 11.31 = \tan \theta$

$\theta = \tan^{-1}(11.31)$

$\theta = 84.9^\circ$ ✓

$$\text{ii. } \rho \left| \frac{1 + \frac{dy}{dx}}{n \frac{d^2y}{dx^2}} \right|^{3/2} = \left[\frac{1 + 11.31}{2.121} \right]^{3/2} = 690.1 \text{ ? units}$$

$$a_t = 3.9 \text{ m/s}^2$$

$$a_n = \frac{(14)^2}{690.1} = 0.284 \text{ ? units}$$

$$a = \sqrt{a_n^2 + a_t^2}$$

$$= \sqrt{(0.284)^2 + (3.9)^2}$$

$$\text{magnitude} = \boxed{3.910 \text{ m/s}^2}$$

**MECHANICAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET
ENGINEERING MECHANICS II**

FALL 2020

Instructor: Dr. April Lovelady

Title of Assignment

FINAL EXAM

Outcome Measured Using this Assignment

Outcome 1

An ability to identify, formulate, and solve **complex engineering problems** by applying principles of engineering, science, and mathematic.

Check the complex engineering problem characteristics related to this assignment

Assignment problem	
	involves wide-ranging or conflicting technical issues,
X	has no obvious solution
	Addresses problems not encompassed by current standards and codes
	involves diverse groups of stakeholders
X	includes many component parts or sub-problems
	involves multiple disciplines
	has significant consequences in a range of contexts
Assignment problem involves the application of the principles of	
X	engineering
	science
X	mathematics

Brief justification of why this assignment is suitable for this outcome

The questions on this section of Test 2B tests the student's ability to identify relevant laws and equations, formulate the solution methodology, and solve the resulting engineering equations in fluid systems. Test 2B also tests the student's ability to perform analysis for a piping system sizing a pump and sizing a flow meter for measuring the range of flow in the piping system. It also tests the students' ability to make reasonable assumptions for sizing a heater for a fluid system.

The problem has no obvious solution since assumptions need to be made and it involves analysis to size several components including pump, pressure transducer, flow meter, and a heater.

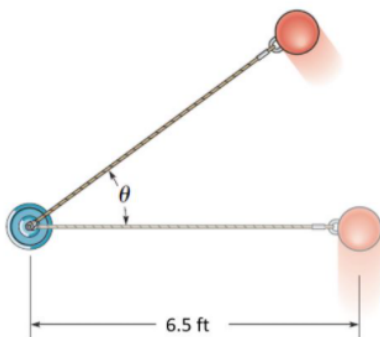
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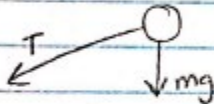
- **Single Attempt** - You will have one attempt for this exam with that score being recorded in the grade book.
- **Timing** - You are allotted 60 minutes to complete this exam. Once 60 minutes has expired, the exam will close and your grade will be based on the work completed.
- **Engineering Problem Solving Method** - Please be sure to follow the engineering problem solving method and label each step. The steps are:
 - Givens
 - Find
 - Assumptions (If there are no assumptions, please write N/A)
 - Properties
 - Schematic/Free Body Diagram
 - Solution
- **Answers**- Will be provided only after everyone has completed the exam.

When finished, click the **"Submit Quiz"** button.

Only registered, enrolled users can take graded exams.

Problem Statement: The ball swings vertically at a speed of $19.7 \frac{ft}{s}$ when $\theta = 0^\circ$. The mass of the ball is 4.5 lbm. Determine the angle where the tension in the cord is zero. Be sure to use the engineering problem solving method and label each step.



#4) Given: $\theta = 0^\circ$, $m = 4.5 \text{ lbm}$, $v = 19.7 \text{ ft/s}$ Find: θ when tension is 0Assumptions: $g = 32.2 \text{ ft/s}^2$ Schematicnormal & tangent
coordinatesSolution

$$T + mg \sin \theta = \frac{mv^2}{R}$$

$$mg = \frac{mv^2}{R} \rightarrow v^2 = Rg \sin \theta$$

Good job!

$$T_1 + V_1 = T_2 + V_2$$

$$\frac{1}{2} m v_0^2 = \frac{1}{2} m v^2 + mgR \sin \theta \rightarrow v_0^2 = \frac{1}{2} Rg \sin \theta + gR \sin \theta$$

$$\sin \theta = \frac{v_0^2}{3gR} = \frac{19.7^2}{3(32.2)(4.5)} = \frac{388.09}{627.9}$$

$$\sin \theta = 0.6181$$

$$\theta = 38.18^\circ$$

Nice work!