

Final Exam - Practice

Time allowed: 2 hours

Open book, open notes

No cell phones

Bring your calculator

All answers and should be on these pages. Use the backs of pages if necessary, but clearly identify which question your work is associated with.

GRADING SHEET – FINAL

NAME: _____

		Points awarded	Max points
Question 1. (14 points)	a) b) c) d) e)		2 2 2 2 6
Question 2. (12 points)	a) Free body diagram b) Equilibrium Equations c) Forces		2 6 4
Question 3. (15 points)	Summary Recommendation Rationale		3 6 6
Question 4. (13 points)	a) Calculation b) Comparison Interpretation		5 5 3
Question 5. (10 points)	a) Gantt Chart b) Critical Path c) Duration		5 3 2
Question 6 (12 points)	a) b) c) d) e) f)		2 2 2 2 2 2
Question 7 (12 points)	a) Cash Flow Diagram b) Calculation Interpretation		5 5 2
Question 8 (12 points)	a) Advantages b) Disadvantages c) Assessment		4 4 4
TOTAL			100

QUESTION 1. (Short Answer Questions)

- a. What does ABET stand for?

- b. Why is it important to have a degree in Civil Engineering from an ABET accredited program?

- c. What are the benefits of joining the ASCE student chapter?

- d. Describe a sub-discipline of civil engineering in which civil engineers interact with other engineers from other disciplines?

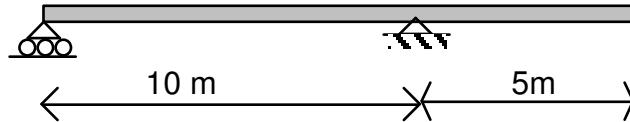
- e. Using the correct number of significant digits, covert the following physical quantities to the proper SI units
 - i. 45 lbm (1lbm = 0.4536 kg)

 - ii. 10×10^2 gal (1 gal = 0.0037854 m³)

 - iii. 250 cu ft per sec (1 cu ft = 0.028317 m³)

QUESTION 2.

Consider the following uniform beam, which has a mass of 12 kg/m and is supported on a roller and a pin support.



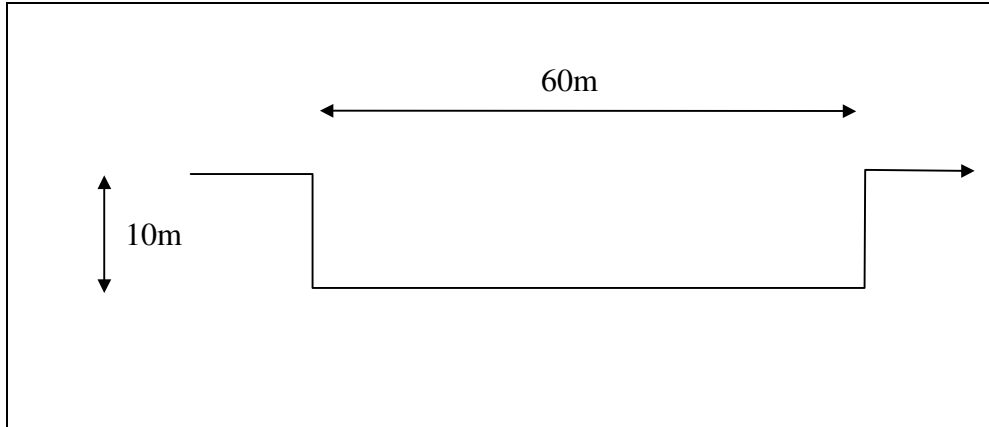
- Draw a free body diagram
- Write the equilibrium equations
- Determine the reactions at the roller and the pin.

QUESTION 3.

Chris, our engineer visits a construction site where a structure designed by him is being erected. Chris has not been hired to supervise the construction. Noticing some unsafe conditions (poor scaffolding, improper shoring etc.), Chris wonders whether or not to report them. On a previous job a colleague had reported some safety violations, and then on later visits had not noticed additional safety violations, which subsequently caused injury to workers. The colleague was sued for carelessness. What should Chris do? Your response should summarize the ethical issues and make a recommendation citing the relevant parts of the professional codes of ethics.

QUESTION 4.

Carbon monoxide is assumed to be a conservative pollutant. On a depressed 4 km long section of urban highway, the carbon monoxide emissions during peak hour are estimated to be 2,180 kg/ hour. Assume the highway right of way is 60 meters wide and the morning peak hour lasts for 2 hours. The highway is depressed 10m below the grade level of the area, there is negligible or no air movement outside the depressed trench, and that the area is initially free of pollutant.



a) What is the carbon monoxide concentration for this section at the end of the morning peak period?

b) The National Ambient Air-Quality Standards define the maximum level of carbon monoxide to protect public health to be $40,000 \text{ mg/m}^3$. Are these levels of carbon monoxide in the trench of concern for drivers, passengers and highway workers? Why or why not?

QUESTION 5.

Pink Floyd Properties has another construction project. You will again bid as a subcontractor. The subcontract is for earthworks in preparation to construction. One of your employees has developed a WBS for the project and a set of precedences as shown below.

Task Number	Task Name and Description	Duration (days)	Predecessors
1.	Site set up	2	
2	Fence area	3	
3	Clear vegetation and topsoil	4	1,2
4	Excavation and hauling	15	3

a) Draw a Gantt Chart for the project

b) Identify the critical path

c) What is the minimum duration for the project?

QUESTION 6.

Develop explanations of the following terms suitable for inclusion in a glossary:

a) Transportation Mode

b) Sprawl

c) Trip

d) Land use

e) Construction manager

f) Cofferdam

QUESTION 7.

A mechanical robot is part of the welding operation for structural steel assembly. The robot costs \$750,000 and because of the specialized function is expected to have a useful life of only six years with an estimated salvage value at retirement of \$40,000. Operating and maintenance costs are expected to be negligible.

a) Sketch the cash flow diagram

b) If the annual interest rate is 8%, at the end of the robot's life what are the total labor savings that must be realized to justify the expenditure of the purchase price?

QUESTION 8.

a) What are the advantages of team based projects?

b) What are the disadvantages of team based projects?

c) Assess how your team (or teams) functioned for the presentations and projects 2 and 3.