Student ID:

UNIVERSITY OF GHANA

B.Sc ENGINEERING

FIRST SEMESTER EXAMINATIONS: 2017/2018

SCHOOL OF ENGINEERING SCIENCES

FAEN 105: ENGINEERING DRAWING WITH CAD (3 CREDITS)

INSTRUCTIONS:
ANSWER ALL QUESTIONS IN SECTION A AND SECTION B.

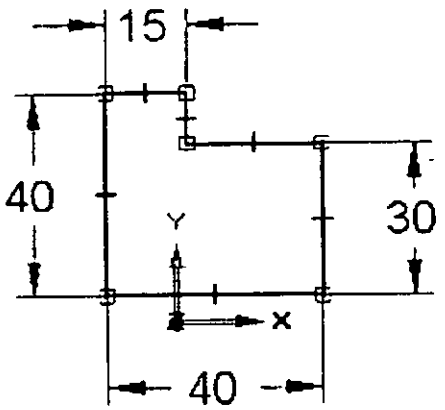
TIME ALLOWED: TWO (2) HOURS

SECTION A

ANSWER ALL QUESTIONS IN THIS SECTION IN THE ANSWER BOOKLET PROVIDED

1. What name do we give to the type of modeling we do in SolidEdge?
2. Name one CAD software other than SolidEdge.
3. What are the characteristics of an orthographic projection view?
4. Explain the term *interpolation*.
5.
   a. Name two types of Curves.
   b. Explain how CAD software generates curves.
6. Name two Features that can be used to create a Surface.
7. What two things must the CAD designer specify to use the Sweep Feature?
8.
   a. What is the difference between Sweep and Loft?
   b. Sketch pictures of any two objects – one which you could create using Sweep and one which you could create using Loft.
9. What two things does CAD software use to determine how to fit different Parts together in an Assembly?
10.
    a. Explain what *degrees of freedom* are.
    b. How does the CAD software use this concept?

11. What could be improved in this sketch? Why?

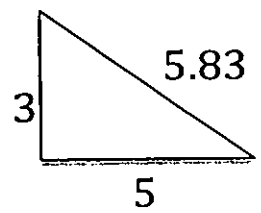


12. Which of the following is the most important for a CAD designer to possess? (Select the letter of your response.)

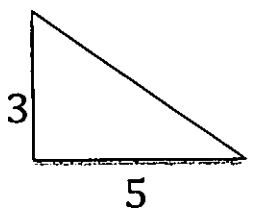
- **a.** Mastery of the technical aspects of the software
- **b.** Design Intent
- **c.** Ability to convert a real object to a CAD version

13. Describe one thing that you think could be improved in the SolidEdge software. For example, maybe there is a Feature that you feel could be conducted in less steps.

14. Which of these would be the best set of dimensions to show on a triangular part you are designing? Why?



a.



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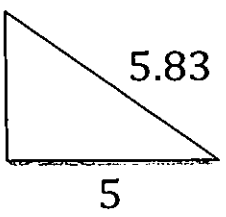

c.

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SECTION B

ANSWER THIS SECTION IN THE ANSWER BOOKLET PROVIDED

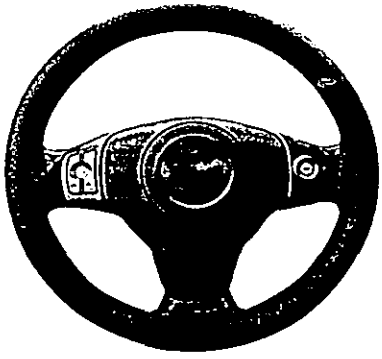
1. You are a CAD engineer for an automobile company. You have been assigned to design the steering wheel assembly for a new car model. This assembly includes the steering wheel and the quick release mechanism (a part that connects the wheel to the hub, and allows it to be removed quickly).

    a. Describe each step for how you would complete this assembly in SolidEdge. Where relevant, include a simple paper sketch of what that step does to the assembly. This means you are drawing what you would be seeing on the screen, if you were designing it in the software.
        i. First describe how you will draw the steering wheel.
        ii. Then describe how you will draw the quick release mechanism.
        iii. Finally describe how you will combine the two.

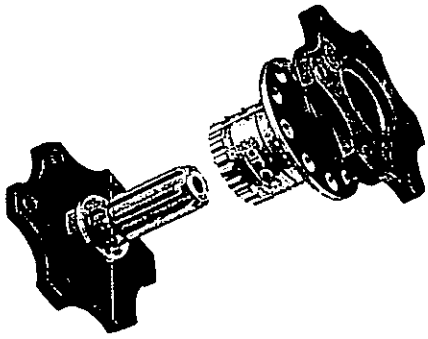
    b. Make a note of which parts you would collect from CAD repositories.

    c. What procedure would you use to select the tolerances for the various parts?

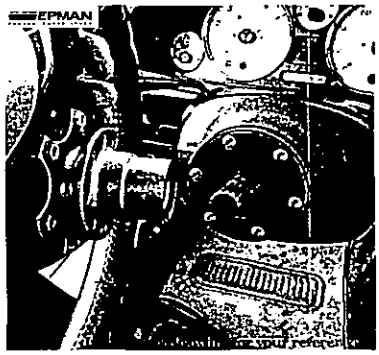
    d. If you were to run a Finite Element load simulation to test the mechanical performance of your assembly, how would you do it? Describe the steps you would conduct in SolidEdge. Indicate where you would apply the load.



Steering Wheel



Quick Release Mechanism



View of the assembly being attached to the hub

Note: You don't have to follow the exact shapes shown in the pictures, but your design should be sensible and realistic.