

UNIVERSITY OF SASKATCHEWAN

Department of Mechanical Engineering

M. E. 229.3 Introduction to Engineering Design

EXAMINATION

Time: 1 hr 30 min (Closed Book)

April 4, 2005

Faculty: E. Arinze, D. Male, T. Threlfall, T. Wiens, S. W. Li and P. B. Hertz

**NOTE: Please answer all questions in the spaces provided or on backs of sheets.
The exam paper must be handed in.
Please PRINT your name at the top of each page.**

STUDENT NAME: (Print) _____

Student Number: _____ Signature: _____

ME 229 Group Number _____

MARKS: 1. ____ / 25

2. ____ / 10

3. ____ / 15

4. ____ / 10

5. ____ / 15

6. ____ / 15

7. ____ / 10

TOTAL _____ %

Groups A & B write in Room 2C40E

Groups C & D write in Room 1B71E

1. Answer each question briefly in the space provided: (25 marks)

(a) What scheduling method employs a bar graph in its layout?

(b) What positions has Gary Wacker P.Eng., held with APEGS?

(c) Name two constraints Dr. Taheri required in design project A _____

(d) What are the two main products marketed by Thiessen's Ceres Industries?

(e) What three types of creative thinking were suggested by Edward deBono?

(f) How many years after graduation are currently required to become a P. Eng. in Saskatchewan? _____

(g) An industrial design may be protected in Canada for _____ years.

(h) In what company did the "Cocoon" originate? _____

(i) Name two types of designs that Erika Ritchie promoted in her lecture?

(j) Who was the Distinguished Graduate at the C. J. MacKenzie Banquet and what topic did he present? _____ , _____

(k) What does the acronym PERT stand for?

(l) For how many years is a Canadian patent issued? _____

(m) What does the acronym MSDS stand for? _____

(n) What common activity has the highest death risk associated with it? _____

(o) What safety feature could prevent a dough-mixer death? _____

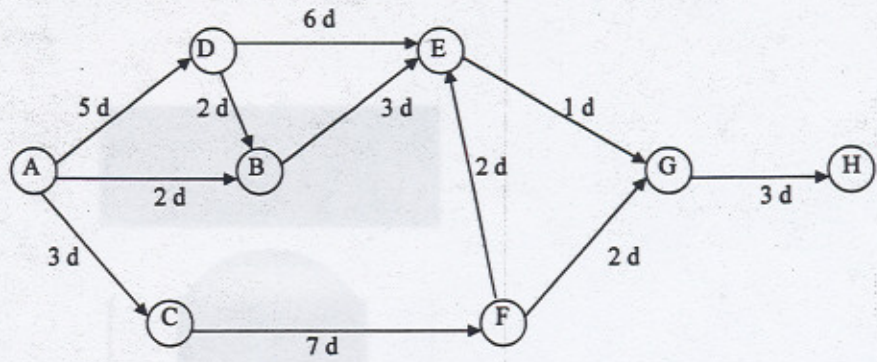
(p) Sketch and label the biohazard warning symbol:

2. For the given PERT diagram, the events are shown with letters while the activity times are shown in days (d). Identify the critical path by means of a **dark line** and calculate the minimum time for project completion. Ans.: Minimum time is _____ days.

For which event does the maximum slack time occur?

Ans.: For event _____.

How many days of slack are there for this event ? _____ (10 marks)



3. An Engineering firm needs to purchase some city vehicles for courier work. They have decided on the relative Importance of seven design criteria for these vehicles and have agreed on the Rating of how each vehicle satisfies these criteria as shown in the following Table. Complete the Value Analysis Table and determine the First, Second and Third choices based on the provided information.
(15 marks)

VALUE ANALYSIS TABLE

Here *I* is *Importance*, *R* is *Rating*, & *V* is *Value*

| TRAITS | <i>I</i> | Honda Civic | | Jetta TDI | | Toyota Prius | |
|------------------|----------|-------------|----|-----------|----|--------------|----|
| | | R | V1 | R | V2 | R | V3 |
| <i>Positive:</i> | | | | | | | |
| Reliability | 3 | 4 | | 3 | | 4 | |
| Function | 5 | 3 | | 3 | | 2 | |
| Comfort | 2 | 3 | | 4 | | 3 | |
| Image | 2 | 2 | | 3 | | 4 | |
| <i>Negative:</i> | | | | | | | |
| Initial Cost | 2 | 2 | | 3 | | 4 | |
| Parts | 1 | 2 | | 3 | | 4 | |
| Fuel Consumption | 4 | 4 | | 3 | | 2 | |

4. AutoCAD 2004 True or False, circle correct answers, errors subtracted: (10 marks)

- A. The layers that are turned off are displayed on the screen but cannot be plotted.
a. True; b. False;
- B. You can lock a layer, which will prevent the user from accidentally editing the objects in that layer.
a. True; b. False;
- C. With the Zoom command, the actual size of the object changes.
a. True; b. False;
- D. The View-ports in the paper space can be of any shape.
a. True; b. False;
- E. The View-ports in the model space can overlap each other.
a. True; b. False.

5. a) Each group that designed a motorcycle trailer for Mr. Littmann used the same type of brakes. What were they? (2 marks)

b) What was Mr. Littmann's target cost for the trailer? Choose one of:

- i) \$500 ii) \$1000 iii) \$1500 iv) none of these . (1 mark)

c) Briefly describe what you view as a serious flaw in one of the other topic* group designs and your suggested alternate solution.

(*If you worked on project A write about one the other three, B, C, or D etc.) (12 marks)

6. In your ME 229.3 Design Project you were exposed to a number of new experiences as you worked with actual clients and group members. (15 marks)

(a) Who was the client in your design? _____

(b) Who was your design group's leader? _____

(c) Who were the members on your design team and about how many total hours did each member work on the project?

You _____ Hours _____

Second Member _____ Hours _____

Third Member _____ Hours _____

Total Hours _____

(d) In terms of a total design contribution of 100%, considering for a group of three equal group contributions would be 33 1/3 %, and for a group of two, 50%, how would you rate the useful percentage contributions of each member in your group?

Fill in names for yourself and each team member, with % contributions to project:

You _____ % _____

Second Member _____ % _____

Third Member _____ % _____

Total = 100.0 %

(e) Comment specifically and confidentially on the relative performances of your own contribution compared to those of other group members, pointing out clearly why equal ratings may not have been assigned in (d) above.

7. An oilfield has nine oil wells spaced 100m apart East and West and 200m apart North and South as shown in the illustration. The nine wells are to be connected with only four lengths of straight pipe, and only three adjustable connecting elbows and no "T"s have been provided. Sketch a design of how the nine wells (●) can be connected with pipes to discharge through a single end point, and calculate the total length of pipe required. (10 marks)

