#91

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: STRUCTURAL DESIGN

Code No.: ARC 213

Program: CIVIL ENGINEERING TECHNICIAN

Semester: IV

Date: JUNE 1988 1988?

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New: _____ Revision: X

APPROVED: L R Chazutte
Chairperson

88/06/20
Date

STRUCTURAL DESIGN AND DETAIL
Course Name

ARC 213
Course Number

PHILOSOPHY/GOALS:

The general objective of the course is to further the basic working knowledge in structural design MCH 207 which is prerequisite for this course. Upon completion the student will have broadened his knowledge in basic design.

METHOD OF ASSESSMENT (GRADING METHOD):

A- 86-100
B- 70- 85
C- 55- 69
R- Repeat
X- Work to be made up or upgraded under special circumstances

-Marks will be accumulated and averaged using test and assignments
-Final testing will be given to students not achieving 75% with no failures on tests or below 80% with one test missed by no more than 5 marks e.g. 50%
-Marks will be deducted for sloppy work
-Assignments will be handed in by due dates
-Attendance, lateness and attitude will be considered in assessment.

TEXTBOOK(S):

C.I.S.C. Steel Handbook
Strength of Materials - Jenson and Chenoweth

STRUCTURAL DESIGN

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TOPIC NUMBER	PERIODS	TOPIC INFORMATION
1	6	ECCENTRIC COLUMN DESIGN a) Eccentric Loads b) Combined axial and eccentric loads
2	20	WALLS AND DAMS a) Buttress b) Cantilever c) Forces d) Middle third e) Design
3	6	FOUNDATIONS a) Types and Purpose b) Reinforceed footing
4	4	SMOLEY'S TABLES a) Uses b) Application
5	20	TRUSSES a) Loading b) Stress diagrams c) Compression members d) Tension members e) Panel points f) Splices g) End connections

CIVIL ENGINEERING TECHNICIAN

PERFORMANCE OBJECTIVES FOR STRUCTRUAL DESIGN

ARC 213

UNIT D - 1 - - RETAINING WALLS

1. Identify the three types of retaining walls.
2. Identify surcharge.
3. Identify the line of action of the retained load from formula, either from an even load of surcharge.
4. Draw the wall and loads to scale, both the applied load and load of wall acting through its center of gravity.
5. Scale the resultant load position accurately with respect to the position along the base.
6. Identify middle third and be able to determine the proper middle third formula to use, then calculate the resulting pressure on the soil.
7. Identify the three checks used in design of the wall.
8. Identify the factors of safety for sliding and overturning.
9. Calculate the checks to made for a retaining wall.
10. Completely draw and do all calculations in the design of a retaining wall, any of the three kinds whether or not including a surcharge.

UNIT D - 2 - - ECCENTRIC LOADING

1. Identify eccentric loading of a column.
2. Identify the actual stress in such a column by use of direct stress formula and stress due to bending.
3. Compare the actual stress with allowable stress used in design by use of $\frac{KI}{r}$ tables or from column formula.
4. Identify the signs for stress (minus or Positive) and use these in the formula for loading of a rectangle in any quadrant or axis.
5. Calculate the stress in any quadrant of an eccentrically loaded rectangle.

UNIT D - 3 - - TRUSS FORCES GRAPHICALLY AND ANALYTICALLY

1. Identify and use Bow's Notation with respect to loads and truss members.
2. Draw to scale force and stress diagrams for trusses using Bow's Notation.
3. Measure stresses accurately from the stress diagram and determine whether the member(s) is in tension or compression.

4. Identify forces in a truss analytically - method of joints.
5. Calculate mathematically, stresses at panel points of a truss using laws of equilibrium, and indicate tension or compression.

UNIT D - 4 - - SMOLEY'S TABLES

1. Calculate bevels using Smoley's tables
2. Calculate slope lengths using Smoley's Tables.
3. By use of bevel tables, determine slope, rise or base for any bevel.
4. Calculate distances by use of similar triangles and the bevel tables.
5. Identify clearance.
6. Identify, edge distance, gauge, and centers when working with connectors.

UNIT D - 5 - - TRUSS DESIGN

1. Design compression members in a truss.
2. Design tension members in a truss.
3. Identify clearance for members at the panel point of a truss.
4. Design the connection using bolts or rivets at the panel point.
5. Calculate the number of connectors for members at any panel point in a truss.
6. Calculate the size of gusset plate at any panel point.
7. Identify a chord splice in a truss.
8. Design and make all calculations as to number of connectors.
9. Design compression or tension truss members when truss is welded instead of bolted or riveted.
10. Design and calculate a welded connection at any panel point or splice in a truss.
11. Design a truss to column connection using either bolted, welded or riveted connection.
12. Use eccentric bolted connection table in Steel Handbook
13. Draw and design by use of free body diagram and stress diagram, a complete truss system. This involves calculation of loads in all members, ten of compression; design member sizes; calculate all levels and length of members; design of all panel points, connections, materials; design of splices; design of truss to column connection. All distances must be calculated and sketch made of each panel to show dimensions.
14. Identify skewed connections, being able to calculate clearance by using Smoley's tables.