

UNIVERSITY OF SOUTH AUSTRALIA
SCHOOL OF GEOINFORMATICS, PLANNING & BUILDING

PROGRAMS: **Bachelor of Construction Management & Economics & Diploma in Built Environment**

COURSE: **STRUCTURES 1 (10285)**

EXAMINATION: **Internal Examination, Semester 2, 2002**

DURATION: **10 minutes of Reading time plus 3 Hours of Exam time, a total of 3 Hrs 10 Min. For ENTEXT students 10 min of Reading time plus 3.5 Hrs of Exam time, a total of 3 Hrs 40 Mins.**

EXAMINER: **Stefan Hornlund, Tel 830 22228**

INSTRUCTIONS TO CANDIDATES:

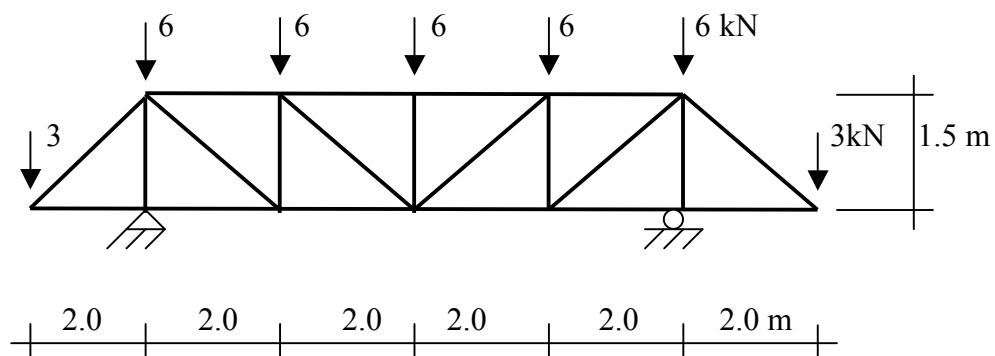
- This exam is worth 40% of the total course marks
- Attempt all questions
- All questions are of equal value
- Any reference materials are allowed. Calculator is allowed.
- State any assumptions made

NOTES FROM EXAMINER:

Please excuse some of the inaccuracies in the drawings and use the dimensions provided.

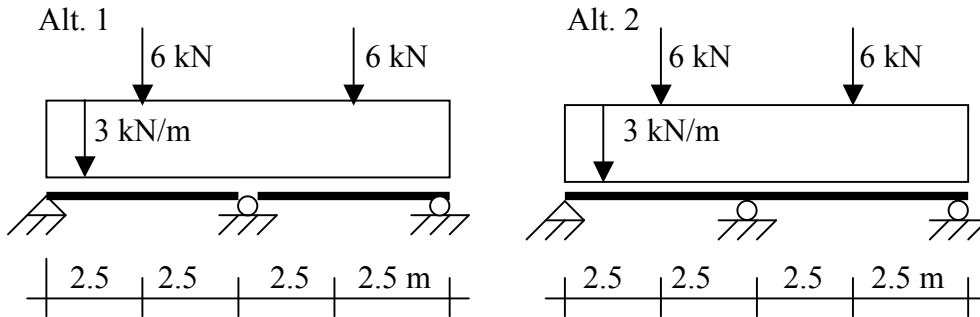
Question 1

Determine the forces in all members of this loaded truss.



Question 2

- a) For a floor beam, as per the figure below, you can chose to use two shorter beams as per Alternative 1 or one long continuous beam as per Alternative 2. Calculate and draw the Shear Force and Bending Moment diagrams for each alternative and comment on the main differences.



- b) Now assume that the maximum bending moment for Alternative 1 was 17 kNm and 14.5 kNm for Alternative 2. *Note that these are not the correct answers to part a) of this question but please use these values for part b) to avoid any errors being carried over from part a).*

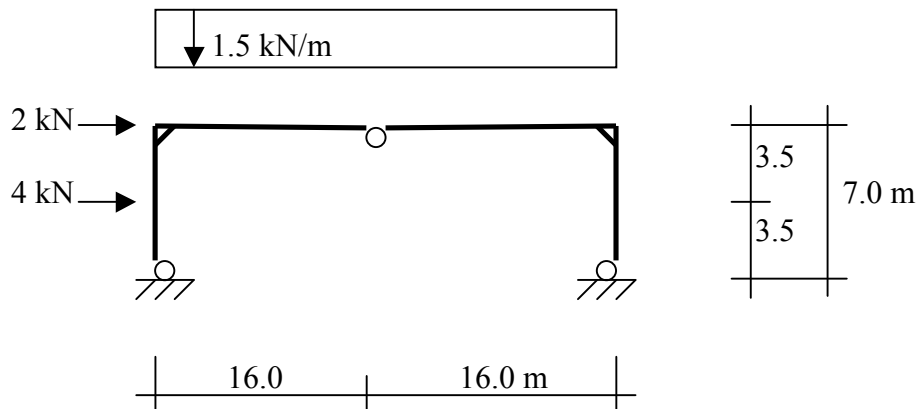
Based on bending stress only, select an appropriate size timber beam from the table below for each of the two alternatives. Use $F_b = 17 \text{ MPa}$ and $E = 8000 \text{ N/mm}^2$.

- 50x90, 50x110, 50x130, 50x150, 50x170, 50x190
 70x150, 70x170, 70x190, 70x210, 70x230, 70x250, 70x270, 70x290
 90x210, 90x230, 90x250, 90x270, 90x290, 90x310, 90x330, 90x350, 90x370

Also determine the cost of each alternative if the cost of timber is $\$1500/\text{m}^3$.

Question 3

- a) Calculate and draw the Bending Moment diagram for this loaded 3-pin Portal frame. Include all extreme values and any points of contra-flexure.



END OF QUESTIONS