Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018

COURSE NAME	:	STRUCTURAL ANALYSIS
COURSE CODE	:	DAC 31502
PROGRAMME CODE	:	DAA
EXAMINATION DATE	:	JUNE/JULY 2018
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWERS **FOUR (4)** QUESTIONS ONLY

TERBUKA

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)**PAGES

Q1 **Figure Q1** shows a truss with a vertical load at B, E and F.

(a) State whether the structure is statically determinate, statically indeterminate or unstable.

(4 marks)

(b) Calculate the reaction at the supports.

(6 marks)

(c) Determine the force in each member of the loaded truss by using **method of joints**.

(15 marks)

Q2 **Figure Q2** shows a truss that is pinned at A and on roller support at F and carries a point load at both C and E. The cross-sectional area of all members is 100 mm^2 and Young's Modulus is 200 GPa.

(a) Determine the stability and determinacy of the truss.

(2 marks)

(b) Calculate the reaction at A and F.

(4 marks)

(c) Calculate the horizontal deflection at F.

(15 marks)

(d) Determine the degree of determinacy if roller support F is replaced with pinned support. State whether this method is still suitable to be used for analysis or not.

(4 marks)

Q3 **Figure Q3** shows a truss pinned supported at A and on roller at B. Horizontal point load is applied at C and E as shown in the figure. Assuming the cross-sectional area of all members is A and the modulus of elasticity is E;

(a) Identify whether the truss is statically determinate or indeterminate. If it is statically indeterminate, determine which member or support is to be omitted so that the truss will become statically determinate.

(5 marks)

TERBUKA

(b) Calculate the reaction on the support.

(5 marks)

(c) Construct the calculation table and calculate the internal force of all members.

(15 marks)

Q4 (a) Give **two (2)** advantages of space truss compare to plane truss.

(3 marks)

(b) Point A, B and C of the space truss as shown in **Figure Q4** are connected to the floor using ball and socket joint. The plane BDEC is vertical and plane ABC is horizontal. Point loads are applied at D and E as shown in the figure. Using tension coefficient method and taking point A as origin, calculate:

(i) Internal force in all members

(16 marks)

(ii) Reaction at support B.

(6 marks)

Q5 **Figure Q5** shows a rigid frame ABCD which supports load on span AB, BC and CD. The value of EI for all members is as shown in the figure.

(a) Determine the degree of indeterminacy of the beam.

(3 marks)

(b) Calculate the moment at all joints using the moment distribution method. (Repeat the calculations for four cycles)

(10 marks)

(c) Draw the bending moment diagram for the beam.

(6 marks)

(d) Calculate the reaction at support A, C dan D.

(6 marks)

TERBUKA

Q6 (a) Sketch the stress diagram of a section of a rectangular beam from elastic until the formation of plastic hinge.

(5 marks)

(b) **Figure Q6** shows a continuous beam ABCD loaded as shown in the figure. Calculate the value of M_p (full plastic moment) for each span using:

(i) Virtual work methods

(9 marks)

(ii) Graphical methods.

(9 marks)

(c) Determine the critical plastic moment and the span that will collapse first.

(2 marks)

TERBUKA

-END OF QUESTIONS-

CONFIDENTIAL

FINAL EXAMINATION

SEMESTER/SESSION	: SEMESTER 2/2017/2018	PROGRAMME	: DAA
COURSE	: STRUCTURAL ANALYSIS	COURSE CODE	: DAC31502

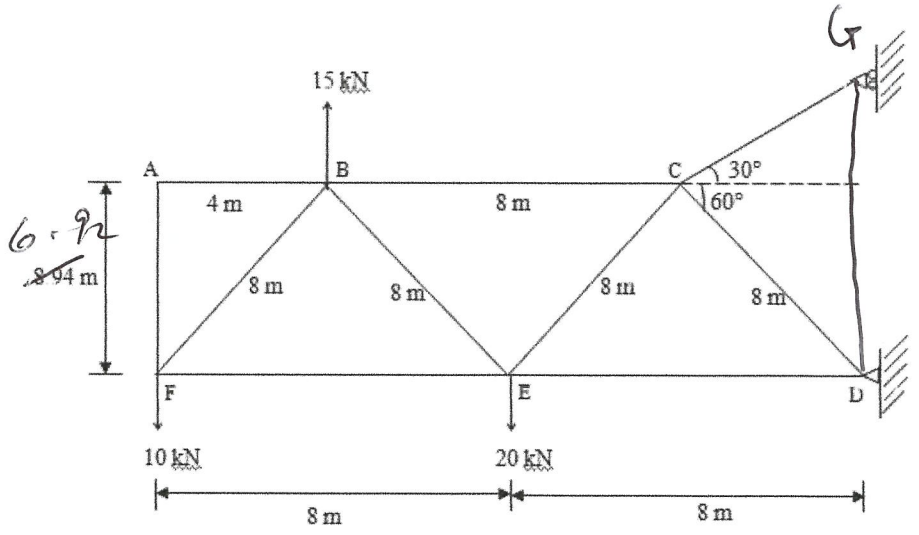


Figure Q1

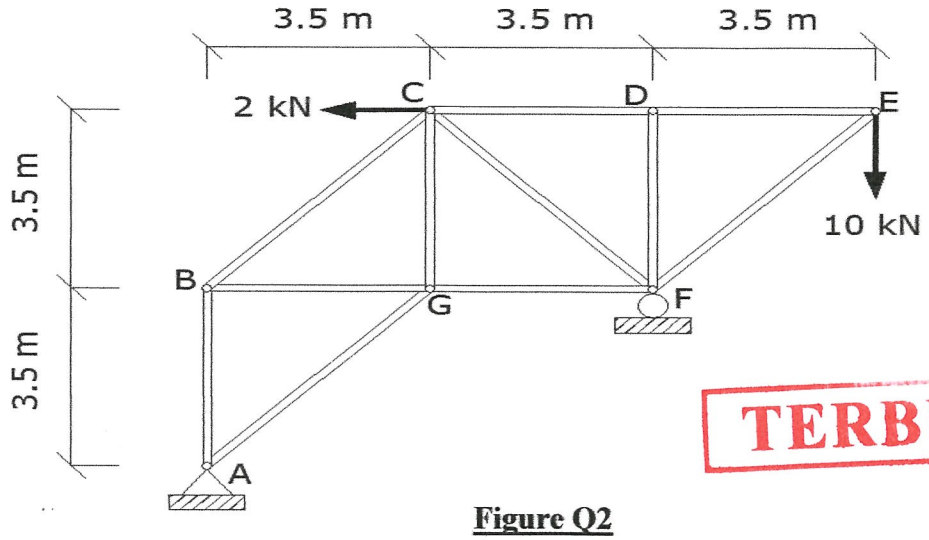


Figure Q2

TERBUKA

CONFIDENTIAL

CONFIDENTIAL

FINAL EXAMINATION

SEMESTER/SESSION	: SEMESTER 2/2017/2018	PROGRAMME	: DAA
COURSE	: STRUCTURAL ANALYSIS	COURSE CODE	: DAC31502

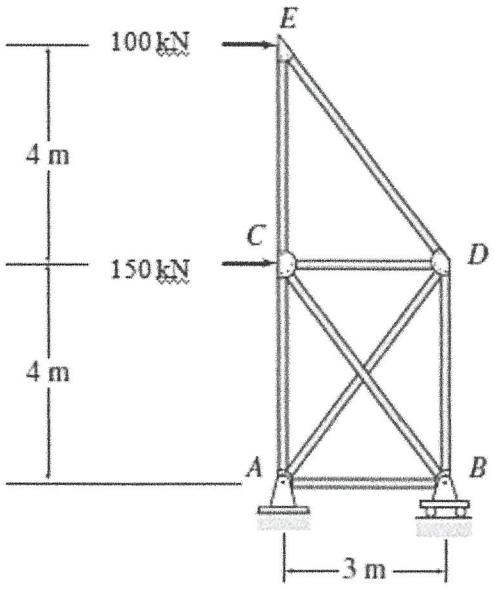
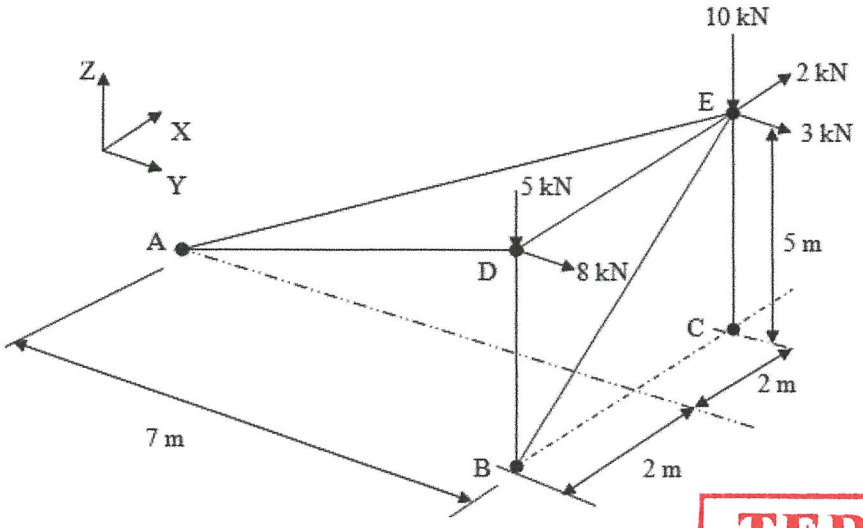


Figure Q3



TERBUKA

Figure Q4

CONFIDENTIAL

FINAL EXAMINATION

SEMESTER/SESSION	: SEMESTER 2/2017/2018	PROGRAMME	: DAA
COURSE	: STRUCTURAL ANALYSIS	COURSE CODE	: DAC31502

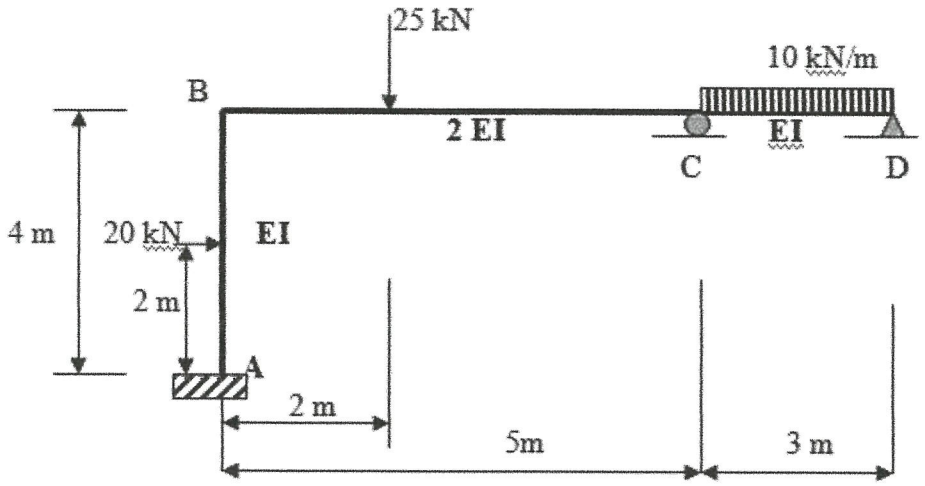


Figure Q5

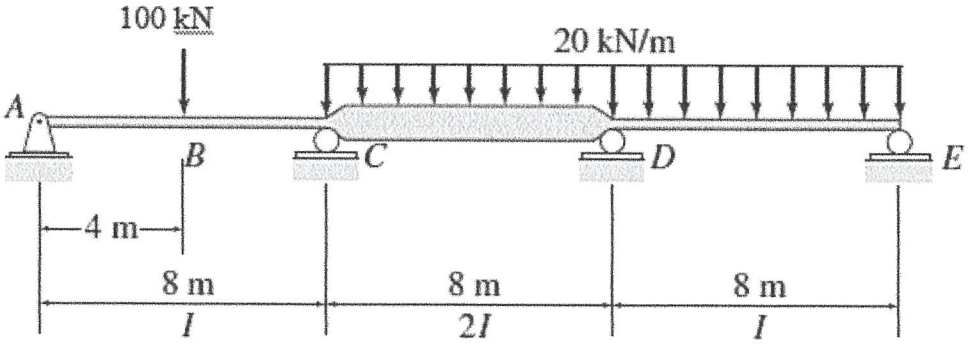


Figure Q6

TERBUKA

CONFIDENTIAL