UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2017/2018

COURSE NAME	:	STATICS
COURSE CODE	:	BDA 10203
PROGRAMME	:	1 BDD
EXAMINATION DATE	:	DECEMBER 2017 / JANUARY 2018
DURATION	:	3 HOURS
INSTRUCTION	:	PLEASE ANSWER **FIVE (5)** FROM **SIX (6)** QUESTIONS

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

Q1 (a) Define the following solution and express with SI unit using appropriate prefix:

(i) (50 mN)(6 GN)

(ii) (400 mm)(0.6 MN)^2

(iii) 45 M^{3}N^3/900 Gg

(9 marks)

(b) By using the knowledge obtain from Static's lecture, propose a design of bridge in an actual size. The bridge design should include some analysis of the simple trusses, support reactions, free body diagrams, zero force member and applicable load/forces and cables acting on the bridge.

(11 marks)

Q2 (a) A free body diagram (FBD) is an essential tool in evaluating and solving an engineering mechanics – statics problem. Using an appropriate example, discuss the steps required in sketching the FBD.

(10 marks)

(b) Figure **Q2(b)** shows two pipes are connected using an elbow at A. Cable BC is used to support the assembly at B. Interpret in vector expression for the tension BC which has the magnitude of 750N.

(10 marks)

Q3 (a) What is the couple system? Explain an example of couple system using an appropriate sketch and its FBD.

(5 marks)

(b) A bracket for a mechanical system as illustrated in Figure **Q3(b)** was in an equilibrium condition. Analyze the magnitude of couple M.

(5 marks)

(c) The combined action of the three forces on the base at O can be obtained by establishing its resultant force (R) and moment (M) as illustrated in Figure **Q3(c)**. Solve the magnitudes of resultant force (R) and moment (M).

(10 marks)

Q4 (a) Figure **Q4(a)** demonstrates a drawbridge with joint loadings based on the weight of the roadway. Analyse the forces in members CD, CF and GF. State if such members are in tension or compression.

(10 marks)

(b) Mechanical system as illustrated in Figure **Q4(b)** supports the 60kg load using an axle, cable, rollers and frictionless pulleys. Solve the magnitude of the reaction force at joint A.

(10 marks)

Q5 (a) A bell-shape shell can be illustrated in Figure **Q5(a)**. If parameter 'a' represents the radius of arc and circle, determine the outside surface area of the shell.

(10 marks)

(b) Figure **Q5(b)** shows a bracket, which is fabricated using sheet metal. Interpret the center of mass of the bracket in three dimensional results.

(10 marks)

Q6 (a) Figure **Q6(a)** indicates a load W and a 100 lb block are connected using cable and frictionless pulleys. Propose the range of load W to obtain an equilibrium condition.

(10 marks)

(b) Figure **Q6(b)** shows a 15kg ladder has a small roller at the top end B and rough surface at the ground end A with static friction's coefficient 0.25. The mass center of the 90kg painter is directly above her feet. Solve the distance 's' to which the painter can climb without causing the 4m ladder to slip.

(10 marks)

– END OF QUESTION –

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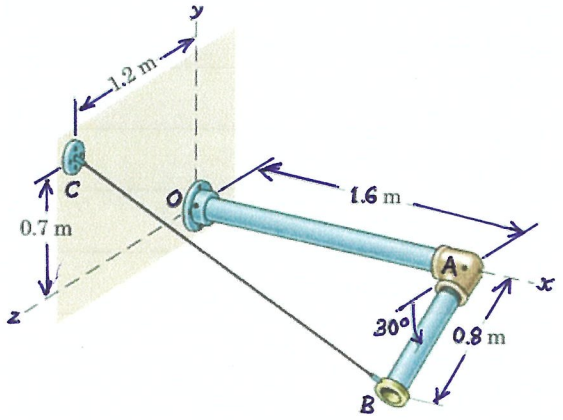

Figure Q2 (b)

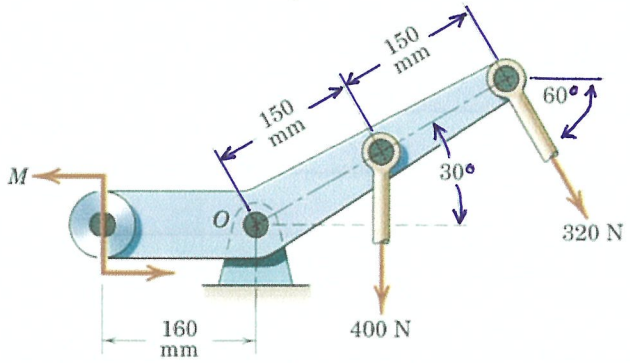

Figure Q3 (b)

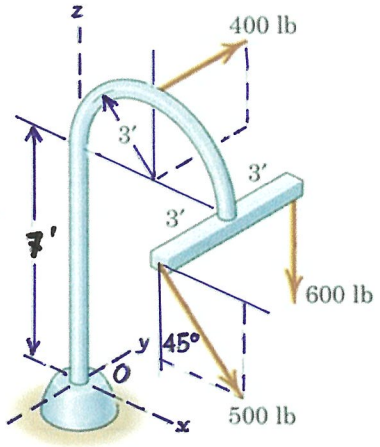

Figure Q3 (c)

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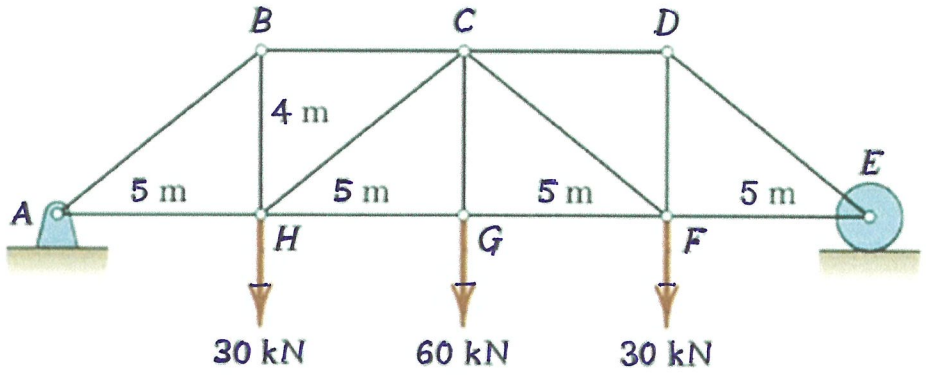

Figure Q4 (a)

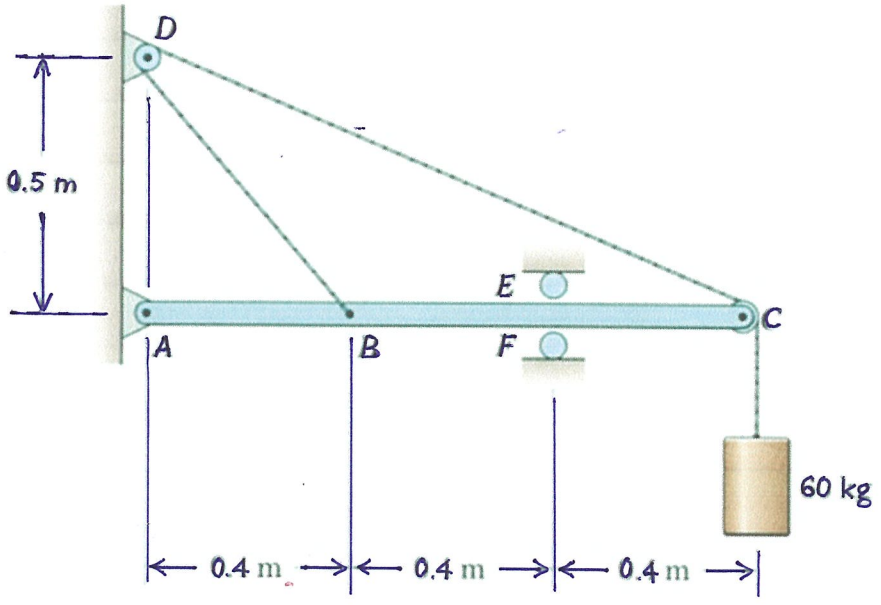

Figure Q4 (b)

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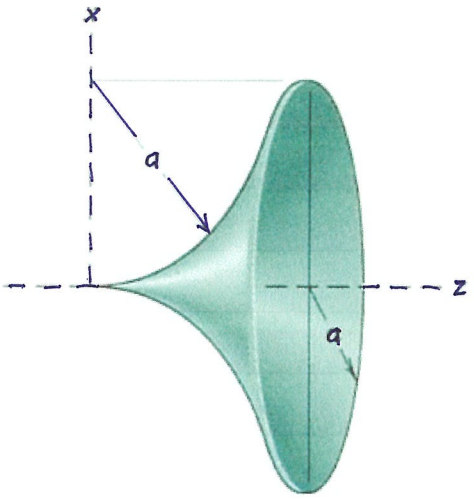

Figure Q5 (a)

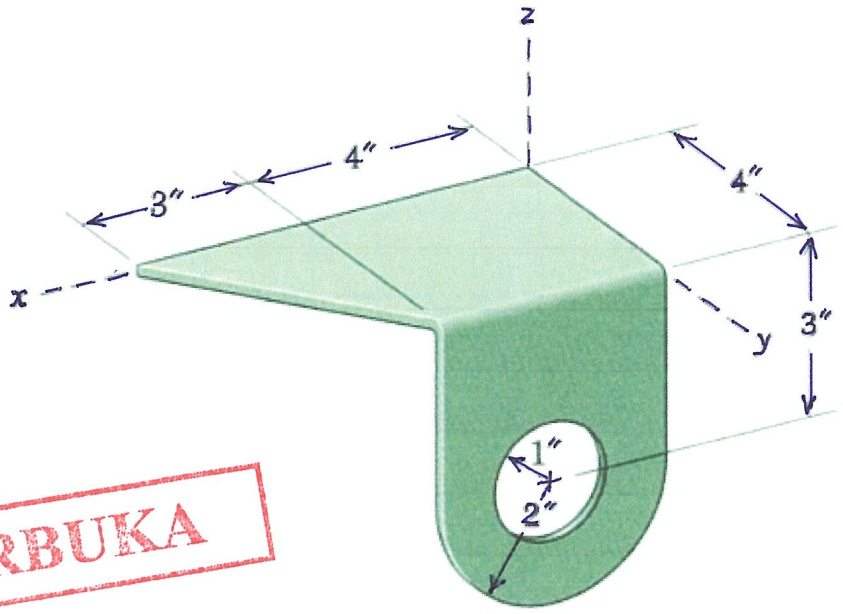

Figure Q5 (b)

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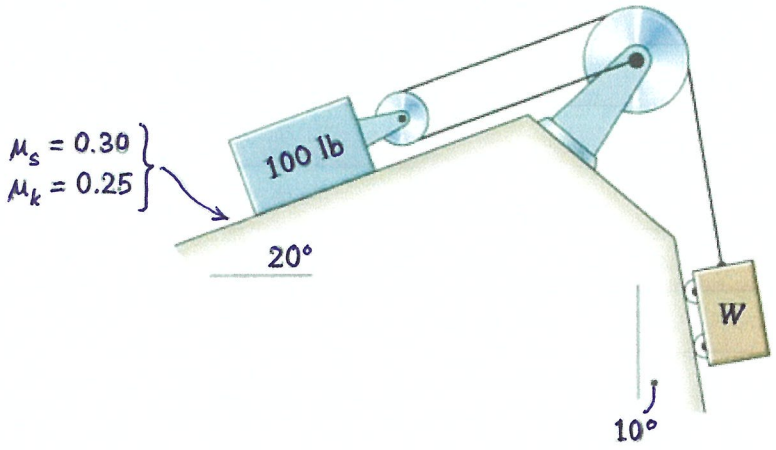

Figure Q6 (a)

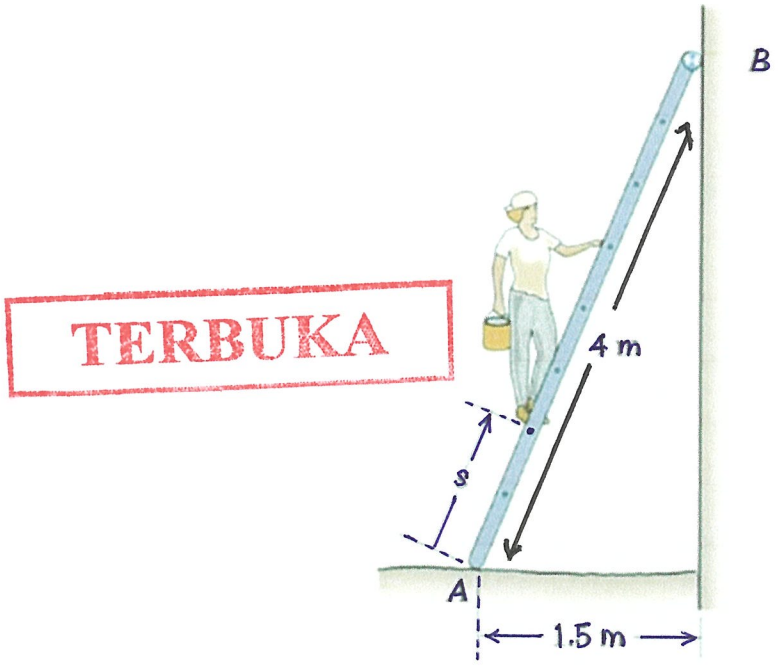

Figure Q6 (b)