Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017

COURSE NAME	:	ENGINEERING MECHANICS
COURSE CODE	:	BDU 10503
PROGRAMME	:	BDC / BDM
DATE	:	JUNE 2017
DURATION	:	3 HOURS
INSTRUCTIONS	:	ANSWER **FIVE (5)** QUESTIONS ONLY OUT OF **SIX (6)** QUESTIONS

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THIS QUESTIONS PAPER CONSIST OF **SIX (6)** PAGES

Q1 A statics experimental setup as shown in **Figure Q1** is mounted at a concrete wall. Point *B* and *C* which are holding the cable are connecting at the same point of *A*. A weighing block hanging at point *A* produce a tension of 560 *N* along the *AB* cable.

(i) Express the unit vectors of U_{AB} and U_{AC}.

(6 marks)

(ii) Calculate the force vector of F_{AB}.

(4 marks)

(iii) Using a Vector Dot Product, distinguish the magnitude projected component of the force acting along *AC* cable.

(6 marks)

(iv) Solve the projected component in cartesian vector.

(4 marks)

Q2 (a) **Figure Q2(a)** shows forces acting at column which is mounted at floor. Determine and locate the resultant force measuring from point A

(10 marks)

(b) Predict the distributed loading as shown in **Figure Q2(b)** with an equivalent resultant force, and specify its location on the beam measured from A.

(10 marks)

Q3 An Architect had proposed a construction design drawing of a roof truss as illustrated in **Figure Q3**. As a Design Engineer you need to analyze the force acting on the truss. Assuming the horizontal components of force at the support are neglected;

(i) Calculate the reaction force of F_A and F_G.

(4 marks)

(ii) Sketch the force acting at section *1-1* and *2-2*.

(6 marks)

(iii) Determine the force along truss *CD* and *DE*.

(6 marks)

(iv) Using the method of joint at point *D*, distinguish the force acting along *DJ*, F_{DJ}.

(4 marks)

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Q4 (a) Differentiate between kinetics and kinematics.

(4 marks)

(b) Sketch and explain three types of rigid body motions.

(6 marks)

(c) A car moves in a straight line such that for a short time its velocity is defined by $v = (0.9t^2 + 0.6t)$ *m/s* where t is in seconds. At $t = 3s$;

(i) Determine the car position.

(6 marks)

(ii) Calculate its accelerations.

(4 marks)

Q5 A rotating equipment with a 3 phase electric motor is used to turn a pulley attached to the blower fan as shown in **Figure Q5**. Pulley A and B within a given diameter of 300mm and 800mm respectively is connected using transmission v belt. If pulley A begins to rotates from rest with an angular acceleration of $\alpha_A = 2$ *rad/s*^{2} and no transmission belt slip occurred. Just after pulley B complete 360° revolution;

(i) Analyze the velocity of point P at pulley B.

(ii) Calculate the acceleration of point P at pulley B.

(20 marks)

Q6 (a) State the possibilities of impact in particles and impact in rigid body.

(3 marks)

(b) Two discs A and B, have a mass of 3kg and 5kg respectively. They collide with the initial velocities as shown in **Figure Q6** with the coefficient of restitution, $e = 0.65$. Given that $V_A = 6$ *m/s*, $V_B = 7$ *m/s* and $\theta = 60°$.

(i) Calculate the velocities of both discs just after the impact.

(12 marks)

(ii) Analyze the directions measuring from positive x-axis.

(5 marks)

-END OF QUESTION-

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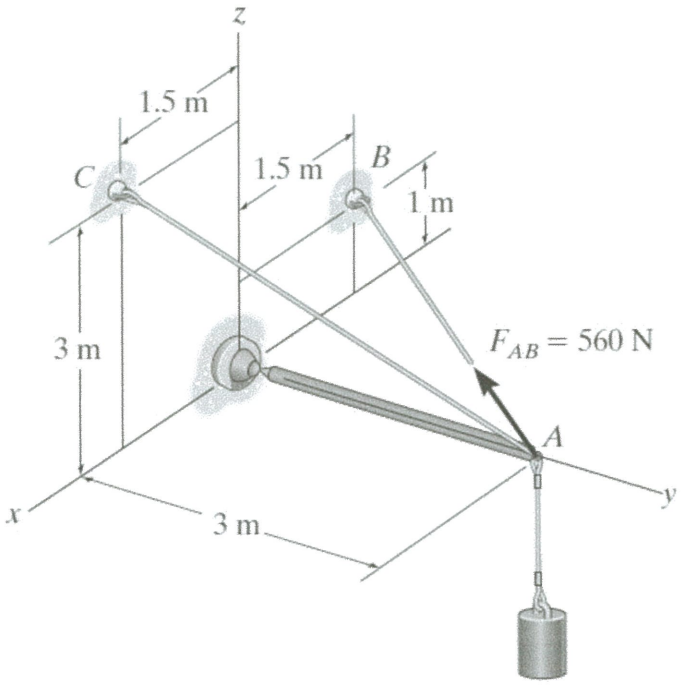

Figure Q1

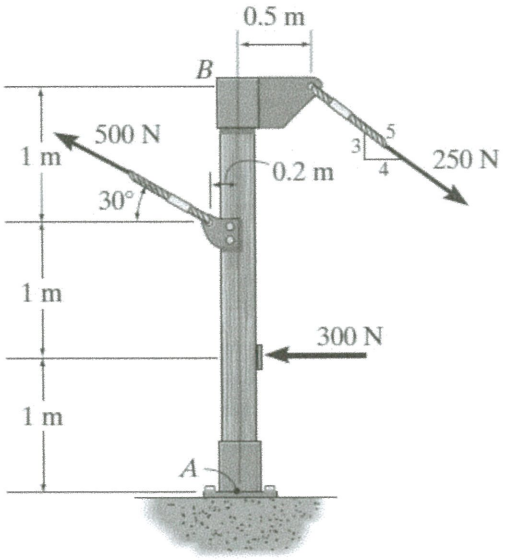

Figure Q2(a)

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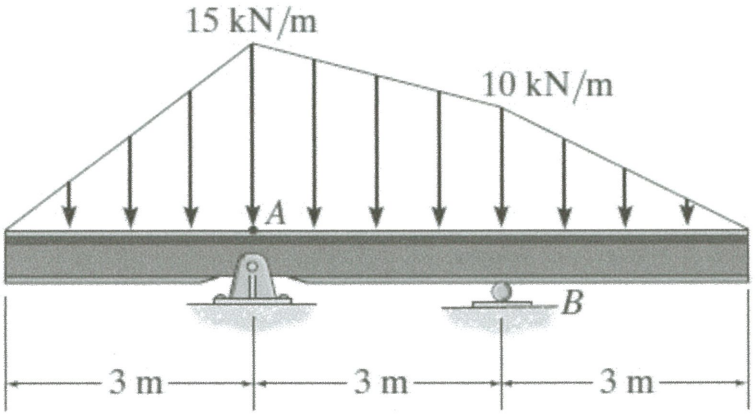

Figure Q2(b)

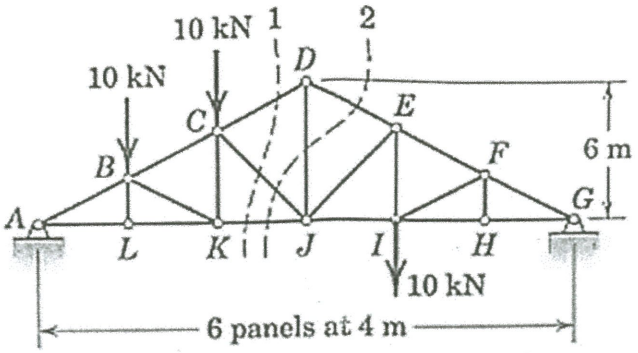

Figure Q3

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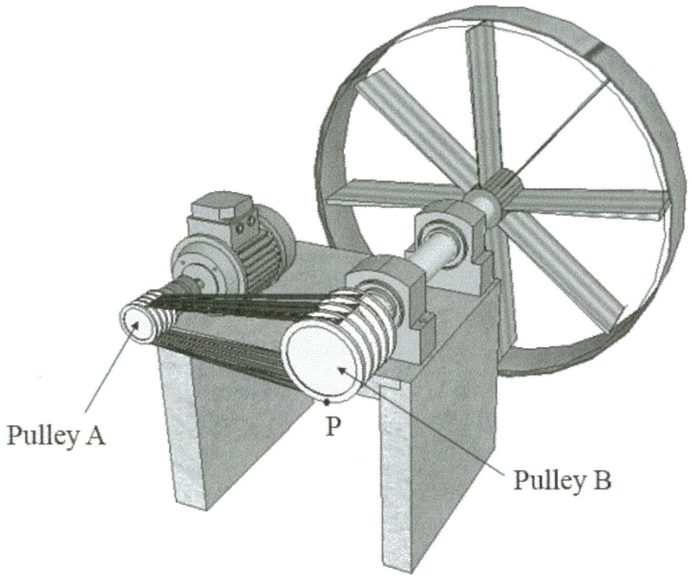

Figure Q5

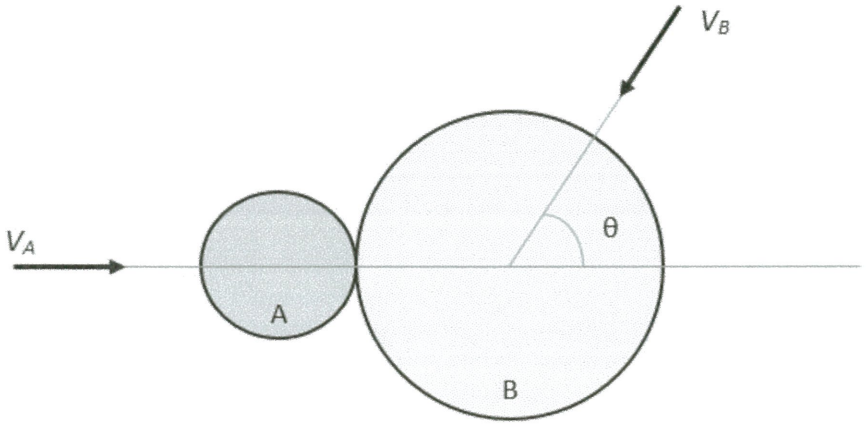

Figure Q6

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