Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(TAKE HOME)
SEMESTER II
SESSION 2019/2020

COURSE NAME	:	MECHANICAL SCIENCES
COURSE CODE	:	BEF 25903
PROGRAMME CODE	:	BEV
EXAMINATION DATE	:	JULY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS **OPEN BOOK EXAMINATION**

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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Q1 (a) Free body diagram is an essential tool in static problem evaluation. Explain the step required in order to sketch an appropriate free body diagram.

(10 marks)

(b) **Figure Q1 (a)** shows a system equilibrium at ring A. Sketch the free body diagram of the system and determine the tension in cable AB and AD for equilibrium of the 2kN engine.

(10 marks)

Q2 (a) Define term 'kinematics' and give one example.

(5 marks)

(b) Define term 'kinetics' and give one example.

(5 marks)

(c) A disc with a radius of 50cm rotates from rest to a constant speed of 2 rad/s^2. Determine:

(i) the final rotational speed after 12s.

(ii) the numbers of revolution the disc made during the period of 12s.

(10 marks)

Q3 (a) Explain the term 'primary bonding' and 'secondary bonding' in materials structure.

(8 marks)

(b) Define the characteristics of metals, ceramics and polymers in terms of its properties, atomic structure and bonding.

(8 marks)

(c) Define the differences between the elastic and plastic deformation in terms of the effect on the crystal lattice structure with the help of appropriate illustrations.

(4 marks)

Q4 (a) States the properties of fluids.

(6 marks)

(b) A lump of clay is put into a tank filled with water and the lump sinks. However, when the same clay is shaped as a boat, it floats. Explain this observation.

(6 marks)

(c) Find the hydrostatic force on the following plate submerged in water as shown in **Figure Q4.**

(8 marks)

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Q5 (a) Explain the basic concept of thermodynamics.

(5 marks)

(b) Explain the two primary classes of thermodynamic cycles.

(5 marks)

(c) An ideal gas is contained in a closed assembly with initial pressure and temperature of 220 kPa and 70°C respectively. If the volume of the system is increased 1.5 times and the temperature drops to 15°C, determine the final pressure of the gas.

(10 marks)

-END OF QUESTIONS –

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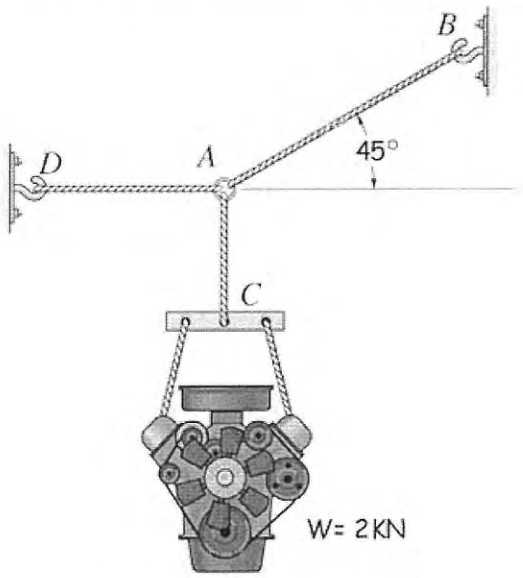

Figure Q1 (a)

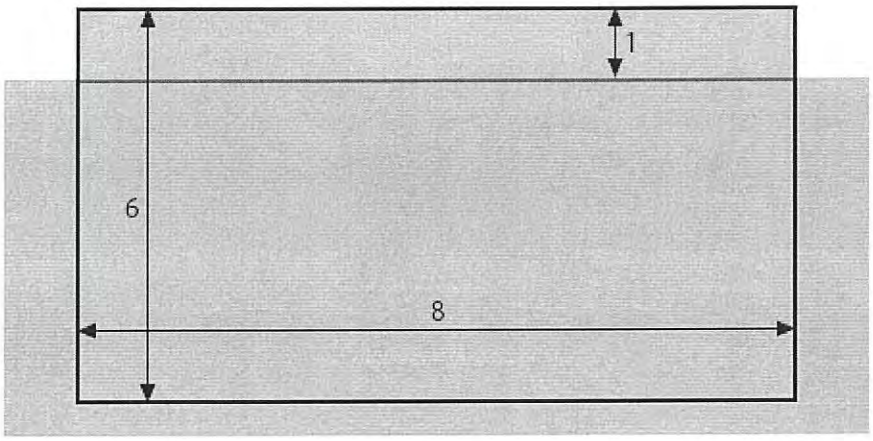

Figure Q4

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