



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
UNIVERSITY OF BARISAL

FINAL EXAMINATION-2017

Course Title: Basic Mechanical Engineering

Course Code: EEE-1207

1st Year, 2nd Semester

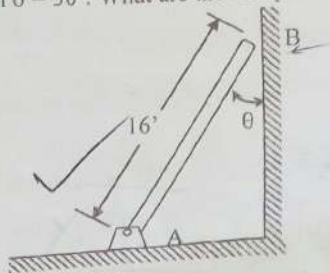
Session: 2016-17

Marks: 60

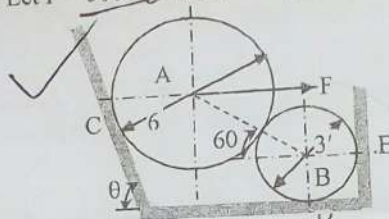
Time: 2 hours

Answer any four Questions from the followings. Parts of the same question should be answered consecutively.

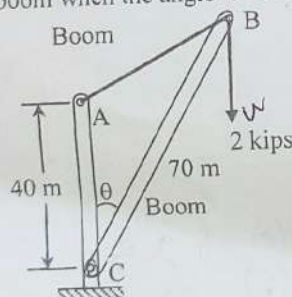
1. a) The member AB, weighs 2000 kg and rests against a smooth wall at B. Determine the reactions at B and A when $\theta = 30^\circ$. What are the components of the reaction at A? [6] 7.5



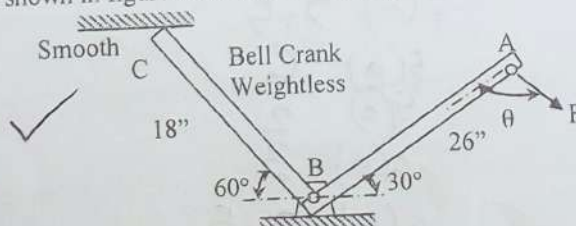
- b) Two spheres are at rest against smooth surfaces as shown. Sphere A weighs 1500-kg. and sphere B weighs 250-kg. Let $F = 500$ -kg. and $\theta = 75^\circ$, find the reactions at C, D and E. [6] 7.5



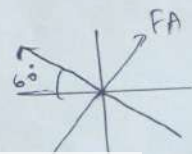
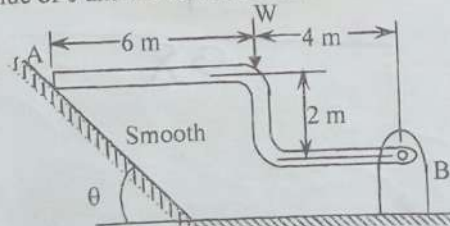
2. a) The derrick shown in figure supports a load of $W = 2$ kips. Find the tension in the boom cable and the compression in the boom when the angle $\theta = 30^\circ$. [6] 7.5



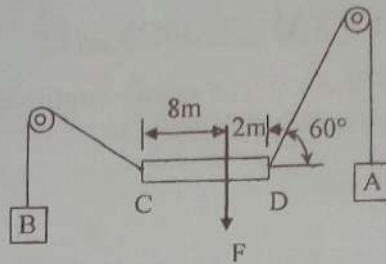
- b) The bell crank shown in figure has a load $F = 100$ kg. If $\theta = 45^\circ$ solve the reactions at B and C. [6] 7.5



- a) In figure the uniform bar weighs 100 kg. If the reactions at B is 65 kg at 120° with the positive x axis, determine the value of θ and the reaction at A. [6] 7.5



- b) In figure, CD is a rigid, weightless body, $F = 140 \text{ N}$, the pegs are smooth, and the cable is weightless and flexible. Determine the weights of A and B if the bodies are in equilibrium and CD remain horizontally. [6] 2.5



4. a) What is meant by energy? Distinguish between renewable and non-renewable sources of energy. [4] 5
- b) What are meant by refrigerator, refrigerant and refrigeration? [3] 4
- c) Define and classify robot. Write down the application of robot in our daily life. [5] 6
5. a) Derive an expression for air standard efficiency of a Diesel cycle engine. [5] 6
- b) Mention the differences between air cooled and water cooled engine. [2] 3
- c) The compression ratio of an ideal air standard Diesel cycle is 15. The heat transfer is 1465 kJ/kg of air. The inlet conditions are 300K and 1 bar . Find (i) maximum temperature and pressure of the cycle, (ii) cycle efficiency and (iii) mean effective pressure. Take for air $C_v = 0.713 \text{ kJ/kg K}$; $R = 287 \text{ J/kg K}$ and constant $K = 1.4$. [5] 6
6. a) Write down the advantages of 4-stroke cycle engine over 2-stroke cycle engine. [3] 4
- b) Define human comfort. What are the factors that affect comfort air conditioning? [4] 4
- c) Write down the purpose of cooling system in I. C. engine. [2] 4
- d) What is meant by air conditioning system? Classify air conditioning system. [3] 3

$$Q_1 = m C_v (T_2 - T_1)$$

1(a) 2.5
1(b) 2.5
2(b) 2.5
5(a) 6
5(c) 2
6(a) 3
6(b) 2.5
6(d) 1

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