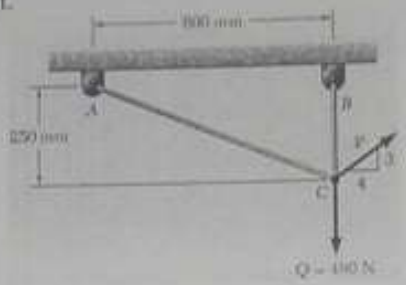
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
UNIVERSITY OF BARISHAL
FINAL EXAMINATION
Course Title: Basic Mechanical Engineering
Course Code: EEE-1207
1st Year, 2nd Semester
Session: 2018-19

06.11.21
Dr. Sultan Mahmud
KUET

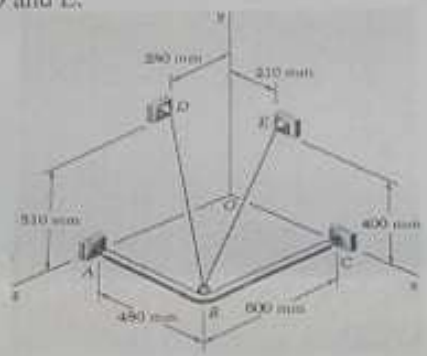
Time: 3 hours
Marks: 60

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

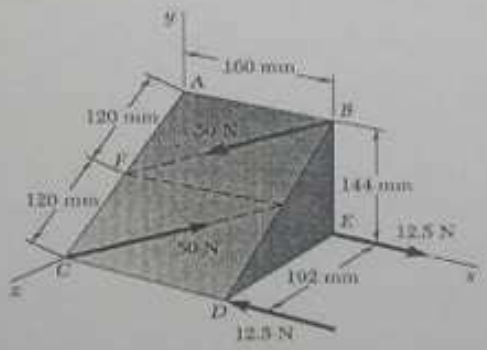
1. a) Two cables are tied together at C and loaded as shown. Determine the range of values of P for which both cables remain taut. [6]



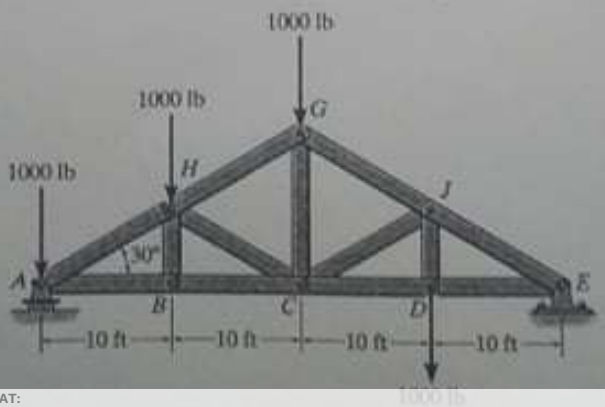
b) A frame ABC is supported in part by cable DBE that passes through a frictionless ring at B. Knowing that the tension in the cable is 400N, determine the components of the force exerted by the cable on the support at D and E. [6]



2. a) Replace the two couples shown with a single equivalent couple, specifying its magnitude and the direction of its axis. [6]



b) Determine the force in member GC of the truss and state if this member is in tension or compression. [6]



3. a) Collar B moves upward with a constant velocity of 1.4 m/s. At the instant when $\theta = 45°$, [6] determine (a) the angular velocity of rod AB, (b) the velocity of end A of the rod.

b) Arm AB has a constant angular velocity of 18 rad/s counterclockwise. At the instant when $\theta =$ [6] 60°, determine the acceleration (a) of collar D, (b) of the midpoint G of bar BD.

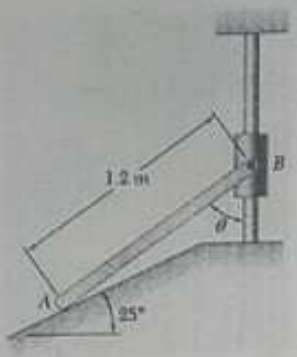


Figure for Q. No. 3(a).

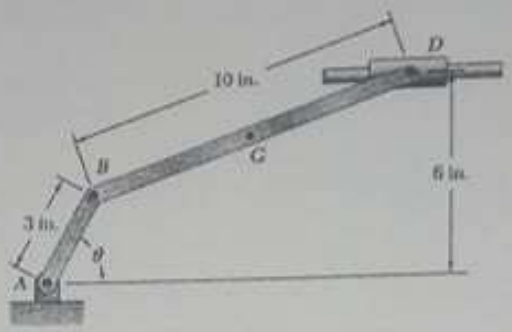


Figure for Q. No. 3(b).

4. a) Define "Robot". What can a robot do? How can you classify the Robot? [4]

b) What are the basic components of a Robotic system? State the main function of each of the components. [4]

c) Write shorts notes on: (i) Manipulator, (ii) End effector. [4]

5. a) What is sensor? Describe the mechanism of the following sensors with their applications: i) Ultrasonic distance sensor, ii) Piezoelectric sensor, and iii) LVDT sensor [6]

b) Define actuators in Robot with its important properties. [3]

c) Write down the characteristics of Actuator systems. Also discuss about robot axis. [3]

6. a) What are the differences between Petrol engine and Diesel engine? [2]

b) Describe the working principle of a four stroke cycle diesel engine with appropriate sketches. [6]

c) Explain the terms: i) Scavenging, ii) Supercharging, and iii) Turbocharger iv) Detonation [4]

7. a) What is refrigeration? Explain the purpose and application of refrigeration. Also write down the properties of a good refrigerant? [3]

b) Explain the vapor compression refrigeration system with the help of P-h and T-s diagram. [3]

c) Writ down the classification of air-conditioning system. [2]

d) Explain the working principle of a summer air-conditioning system with a suitable sketch. [4]

8. a) What is meant by energy? Distinguish between conventional and non-conventional sources of energy. Also discuss the present electrical energy situation in Bangladesh [4]

b) What are the properties of a good refrigerant? [3]

c) What is the function of a carburetor, a piston ring and a spark plug for a petrol engine? [3]

d) How can you classify refrigerants? What is the unit of refrigeration? [2]

Good Luck!!!