JOHN EDMONDSON HIGH SCHOOL
Assessment Notification

Faculty: Industrial Arts   **Course:** Engineering Studies   **Year:** 12

Assessment Task: Personal & Public Transport Research Task + Mechanics

Assessment Weighting: 30%   **Due:** Term 2 Week 1 Date: 03/05/2024

Task Type: Hand in Task ☒   In Class Task ☐ Practical Task   ☐

Outcomes assessed (NESA)
H2.1 determines suitable properties, uses and applications of materials, components and processes in engineering H3.1 demonstrates proficiency in the use of mathematical, scientific and graphical methods to analyse   and solve problems of engineering practice H4.1 investigates the extent of technological change in engineering H6.1 demonstrates skills in research and problem solving related to engineering reports
Task Description/Overview
1. You are to research and prepare a Report on one of the following as assigned to you: Queen Mary 2, Bullet Train, Monorail, Ferrari, Audi A4, Segway, Bicycle, Maglev Train, Formula 1. 2. Provide fully worked solutions to engineering mechanics problems.
Detailed Assessment Task Description
You are to discuss the following: a)   Historical development   /5 b)   Design features   /10 c)   Materials used/developed   /10 d)   Mechanical systems eg. Braking, steering etc   /10 e)   Computer applications (in use &/or in design/manufacture)   /10 f)   Electrical systems/motors/gauges   /10 g)   Environmental issues   /10 h)   Sociological issues   /10 i)   References (at least 7)   /5 B.   Problem Solving - Engineering Mechanics Qs You are to provide fully worked solutions to the engineering mechanics questions attached. /20

Assessment Criteria		
Grade	**Description**	**Mark Range**
Outstanding (O)	- Accurate & detailed report of all areas to be researched - Comprehensive list of references - Fully worked and correct solutions to the questions attached	**90-100**

High (H)	- Accurate & detailed report of most areas to be researched - Comprehensive list of references - Mostly correct worked solutions to questions attached	80-89
Sound (S)	- Accurate & detailed report of some areas to be researched - Inadequate amount of references - Worked solutions given to an average standard	70-79
Basic (B)	- Inadequate research - Inadequate amount of references - Poorly worked solutions to questions attached	60-69
Limited (L)	- Unsatisfactory research - Very little references and not to standard - Incomplete and unsatisfactory attempt at the questions attached	0-59

Satisfactory completion of courses

A course has been satisfactorily completed, when the student has:

- Followed the course developed/endorsed by the NSW Educational Standards Authority (NESA)
- Applied himself/herself with diligence and sustained effort to the set tasks and experiences provided in the course.
- Achieved some or all of the course outcomes

Engineering Mechanics – 20 marks

Using full working out, answer the following questions:

Question 1 – 2 marks

A block of stone of mass 100 kg is resting on a horizontal concrete path. Determine the horizontal force P necessary to just cause the block to slide if the coefficient of static friction is 0.5.
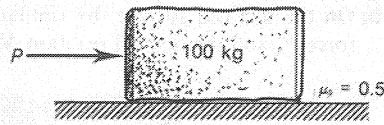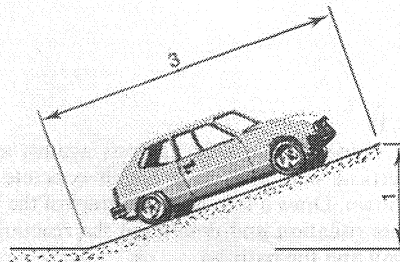

Question 2 – 2 marks

A diesel locomotive is stationary on the track. Given that the mass of the locomotive is 45 tonnes, find the greatest drawbar pull that the locomotive can exert if the coefficient of friction between the wheels and rails is 0.2.
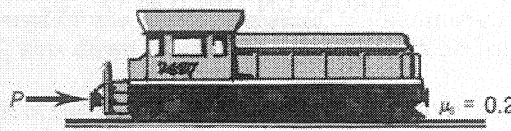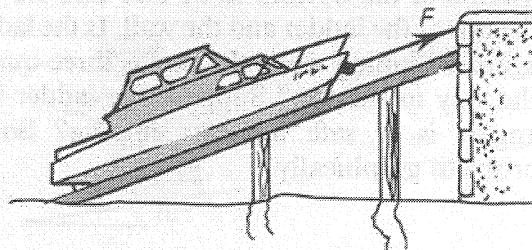

Question 3 – 3 marks

A car of mass 1.2 tonnes is left stationary as shown on a concrete ramp of slope 1 in 3. The bonnet is bumped as the owner passes across in front of the car which then slides a short distance down the ramp. Determine the coefficient of static friction present between the wheels and the concrete.


Question 4 – 2 marks

A boat of mass 2 tonnes rests on a slip which is inclined at 20° to the horizontal, the coefficient of static friction between the slip-rails and the boat being 0.3.
   Determine the least force, F, needed in the winch cable to move the boat down the slip with constant velocity, given that the cable is parallel to the rails.
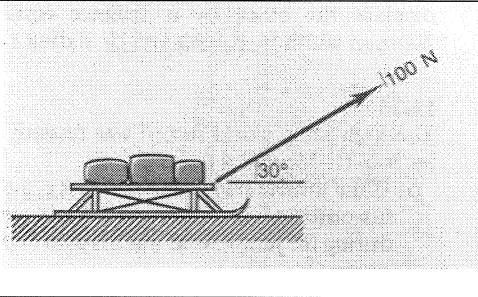
Question 5 – 4 marks

A ladder of mass 20 kg rests against a smooth vertical wall and on a rough concrete path as shown. Draw a free-body diagram of the ladder in this situation and determine the reactions at the wall and the path.

6 m

3 m
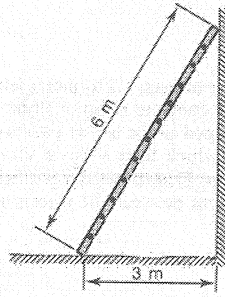
Question 6 – 3 marks

A sled of mass 10 kg is pulled 10 metres along level ground. The tension in the tow rope is 100 N and it is inclined at 30° to the ground as shown. Determine the total work done

100 N

30°

Question 7 – 4 marks

A crate of mass 50 kg is pushed 13 metres up an incline that rises 5 metres vertically over a horizontal distance of 12 metres. If the frictional resistance is constant at 120 N, calculate the work done on the crate.

P

5 m

12 m