Faculty of Engineering and Technology			
Ramaiah University of Applied Sciences			
Department	Civil Engineering	Programme	Bachelor of Technology
Semester/Batch	1st/2017		
Course Code	ESC106A	Course Title	Construction Materials & Engineering Mechanics
Course Leader(s)	Dr. Valsa Ipe / Ms. Deepthi M. V. / Mr. Shrihari K. Naik / Ms. Nimmy Mariam Abraham / Mr. Divakar L.		

Assignment - 01			
Reg. No.		Name of Student	

Sections			Marking Scheme	Max	First Examiner	Moderator
Part A	A.1.1		Significance of different types of infrastructure	03		
	A.1.2		Relation between infrastructure development and economic growth of a country	03		
	A.1.3		Stance taken with justification and conclusions	04		
			Part-A Max Marks	**10**		
Part B.1	B.1.1		Drawing Free Body Diagram	02		
	B.1.2		Resolution of forces	02		
	B.1.4		Calculating the resultant	02		
	B.1.5		Determining moment	01		
	B.1.3		Showing equivalent force couple system and conclusion	03		
			B.1 Max Marks	**10**		
Part B.2	B.2.1		Drawing Free Body Diagram	02		
	B.2.2		Determining the normal reactions when the engine is off	03		
	B.2.3		Determining the normal reactions when the engine is on	03		
	B.2.4		Determining the percentage change in the normal reactions	02		
			B.2 Max Marks	**10**		
Part B.3	B.3.1		Free body Diagram	02		
	B.3.2		Resultant of the force system	04		
	B.3.3		Check for stability and conclusion	04		
			B.3 Max Marks	**10**		

Part B.4	**B.4.1**	Drawing Free Body Diagram	02		
	B.4.2	Resolution of forces	03		
	B.4.3	Determining the value of θ	04		
	B.4.4	Stating the value of maximum moment	01		
		B.4 Max Marks	**10**		
		Total Assignment Marks	**50**		

Course Marks Tabulation					
Component-1 (B) Assignment	**First Examiner**	**Remarks**	**Moderator**	**Remarks**	
A					
B.1					
B.2					
B.3					
B.4					
Marks (Max 50)					
Marks (out of 25)					

Signature of First Examiner   **Signature of Moderator**

Please note:

1. Documental evidence for all the components/parts of the assessment such as the reports, photographs, laboratory exam / tool tests are required to be attached to the assignment report in a proper order.
2. The First Examiner is required to mark the comments in RED ink and the Second Examiner's comments should be in GREEN ink.
3. The marks for all the questions of the assignment have to be written only in the **Component – CET B: Assignment** table.
4. If the variation between the marks awarded by the first examiner and the second examiner lies within +/- 3 marks, then the marks allotted by the first examiner is considered to be final. If the variation is more than +/- 3 marks then both the examiners should resolve the issue in consultation with the Chairman BoE.

Assignment

Term - 1

Instructions to students:

1. The assignment consists of **5** questions: Part A – **1** Question, Part B- **4** Questions.

2. Maximum marks is **50**.

3. The assignment has to be neatly word processed as per the prescribed format.

4. The maximum number of pages should be restricted to 20.

5. Restrict your report for Part-A to 3 pages only.

6. Restrict your report for Part-B to a maximum of 17 pages.

7. The printed assignment must be submitted to the course leader.

8. **Submission Date: 09 October 2017**

9. **Submission after the due date is not permitted.**

10. **IMPORTANT**: It is essential that all the sources used in preparation of the assignment must be suitably referenced in the text.

11. Marks will be awarded only to the sections and subsections clearly indicated as per the problem statement/exercise/question

Preamble:

This course deals with fundamentals of Civil Engineering materials and laws of Engineering Mechanics for statics/equilibrium of rigid bodies. Students will be taught the significance of Civil Engineering in infrastructure and exposed to construction materials. They will be trained on application of engineering mechanics to solve practical problems pertaining to statics/equilibrium of rigid bodies. In addition, effects of friction, energy methods for analysing static and dynamic analysis of rigid bodies will be dealt.

Part A (10 marks)

Since the time of independence, India has made a lot of developments, from launching satellites to green revolution, to atomic power plants. However, India is still a developing country. The basic difference between a developed and a developing country lies in the level of unemployment and poverty, living conditions, type of revenue generation, distribution of income and its overall growth. Greater access of the poor to education and health services, water and sanitation, road network and electricity is needed to bring equitable development and social empowerment.

In this context, debate on the topic:

'**Infrastructure plays a major role in the economic development of a country and benefiting only the rich**'

Your debate should address the following:

A.1.1 Significance of different types of infrastructure

A.1.2 Relation between infrastructure development and economic growth of a country with respect to the rich and poor

**A.1.3** Stance taken with justification and conclusions

Part B (40 marks)

B.1 (10 marks)

The gear and attached V-belt pulley, which is on the same shaft, as shown in Figure 1 are turning counter-clockwise and are subjected to the tooth load of (1600 + A) N, and tensions of (850 + A) N and (500 + A) N in the V-belt. Represent the action of these forces by a resultant force R at O and a couple of magnitude M. Also, conclude if the unit is slowing down or speeding up.
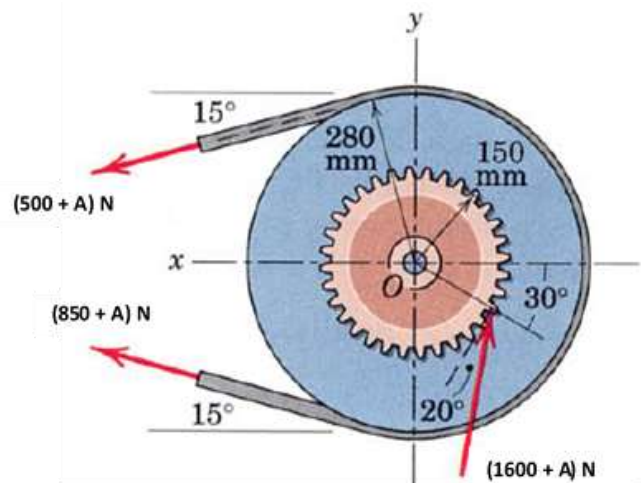
Figure 1

Your answer should include the following:

B.1.1 Drawing Free Body Diagram

B.1.2 Resolution of forces

B.1.3 Calculating the resultant

B.1.4 Determining moment

B.1.5 Showing equivalent force couple system and conclusion

Note: 'A' represents the last two digits of your registration number.

B.2   (10 marks)

During an engine test on the ground, a propeller thrust T = (3000 + 2X) N is generated on the 1800 kg airplane with mass center at G, as shown in Figure 2. The main wheels at B are locked and do not skid; the small tail wheel at A has no brake. Compute the percentage change in the normal forces at A and B as compared with their "engine-off" values.
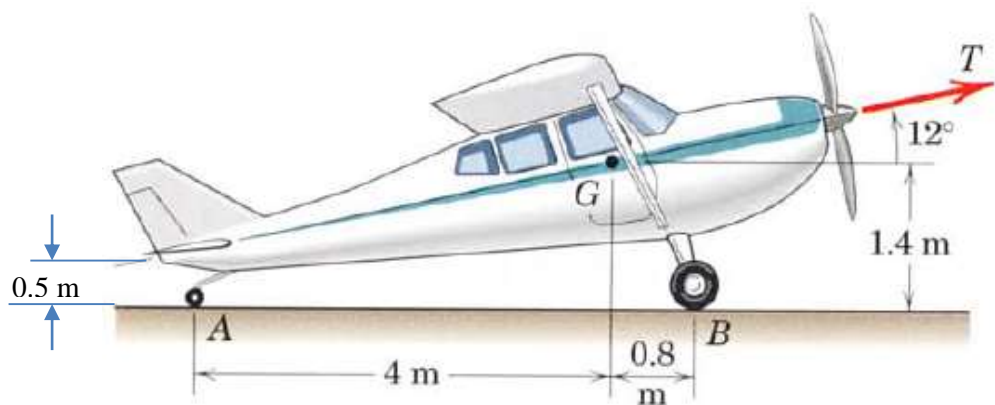
Your answer should include the following:

B.2.1 Drawing Free Body Diagram

B.2.2 Determining the normal reactions when the engine is off

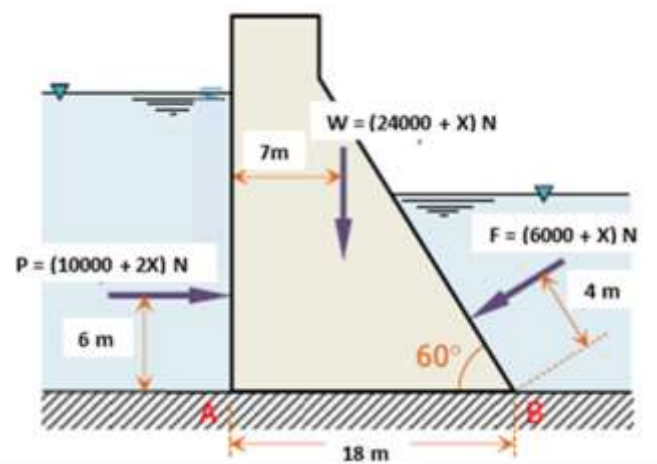**B.2.3** Determining the normal reactions when the engine is on

B.2.4 Determining the percentage change in the normal reactions

Note: 'X' represents the last two digits of your registration number.

B.3   (10 marks)

Determine the resultant of the three forces acting on the dam shown in Figure 3 and locate its intersection with the base AB. Also, conclude if the dam is safe.

Figure 3

Your answer should include the following:

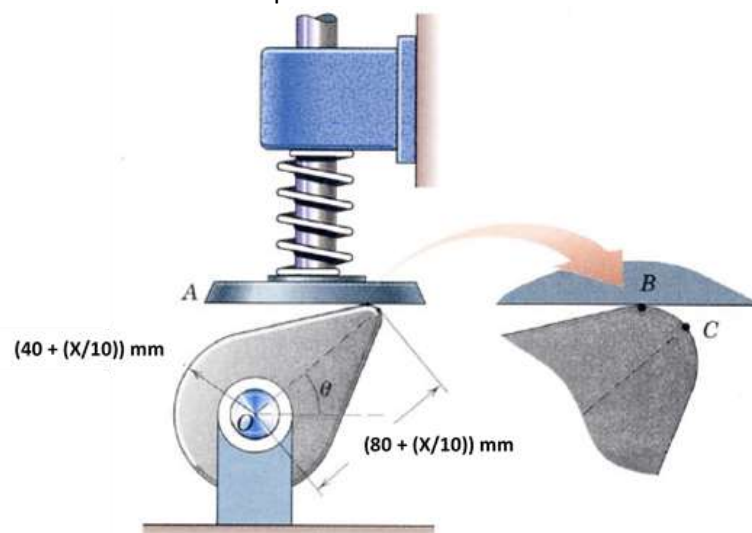**B.3.1** Free body Diagram

B.3.2 Resultant of the force system

B.3.3 Check for stability and conclusion

Note: 'X' represents the last two digits of your registration number.

B.4   **(10 marks)**

The spring loaded follower A bears against the circular portion of the cam until the lobe of the cam lifts the plunger. The force required to lift the plunger is proportional to its vertical movement h from its lowest position. Determine the angle θ for which the moment of the contact force on the cam about the bearing O is maximum. In the enlarged view of the contact, shown in Figure 4, neglect the small distance between the actual contact point B and the end C of the lobe.

Figure 4

Your answer should include the following:

B.4.1 Drawing Free Body Diagram

B.4.2 Resolution of forces

B.4.3 Determining the value of θ

B.4.4 Stating the value of maximum moment

Note: 'X' represents the last two digits of your registration number

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