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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

SEPTEMBER 2013 SESSION

SUBJECT CODE	**:**	**FVD12702**
SUBJECT TITLE	**:**	**STATICS & DYNAMICS FOR AUTOMOTIVE**
LEVEL	**:**	**DIPLOMA**
TIME / DURATION	**:**	**2 Hours**
DATE	**:**	

INSTRUCTIONS TO CANDIDATES

1. **Please read the instructions given in the question paper CAREFULLY.**
2. **This question paper is printed on both sides of the paper.**
3. **Please write your answers on the answer booklet provided.**
4. **Answer should be written in blue or black ink except for sketching, graphic and illustration.**
5. **This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer TWO (2) questions only.**
6. **Answer all questions in English**
7. ***OPEN BOOK***

THERE ARE 4 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1 (20 marks)

a) Explain the difference between Mass and Weight. **(4 marks)**

b) Explain the meaning of 1 Newton's. **(6 marks)**

c) The force acts on the piston of a spark ignition engine, the F = 110 kN. The connecting rod has the position with γ= 12 ° as shown in the **Figure 1**.

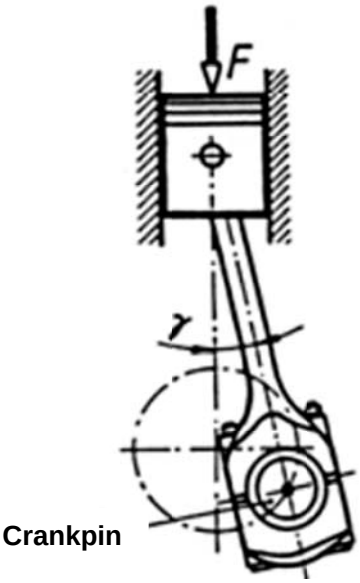

Figure 1

Calculate:

i) The Force F, the piston pushes against the cylinder bore. **(4 marks)**

ii) The force which the connecting rods rod on the crankpin suppressed. (The friction should be ignored.)

(6 marks)

Question 2 (20 marks)

a) Define force and its type. **(4 marks)**

b) Explain the free body diagram. **(6 marks)**

c) The 200-kg engine block is suspended by the cables AB and AC as shown in the **Figure 2**. The angle a = 40°. The free body diagram is obtained by isolating the part of the system within the dashed line is shown. Determine the forces T_{AB} and T_{AC}.

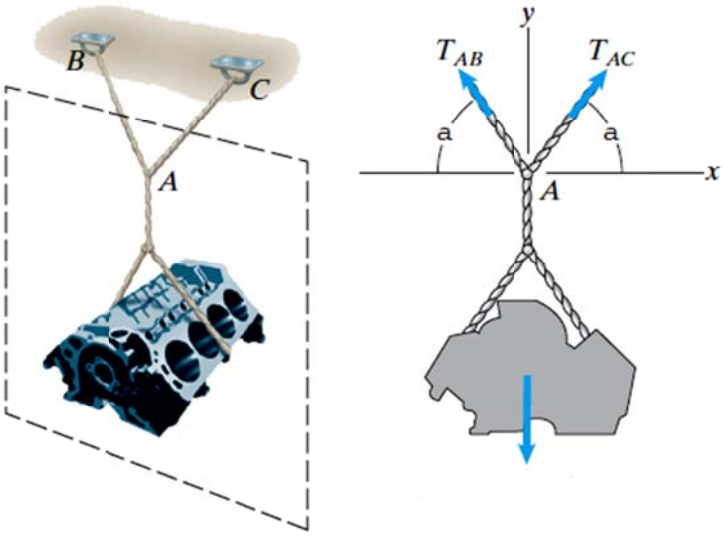

Figure 2

(10 marks)

Question 3 (20 marks)

a) Describe the term of friction. **(4 marks)**

b) "Friction is both desirable and undesirable" Explain with example. **(6 marks)**

c) The 1350 kg car is parked on a sloped street as shown in the **Figure 3**. The brakes are applied to both its front and rear wheels.

(i) If the coefficient of static friction between the car's tires and the road is μ_s = 0.8, what is the steepest slope (in degrees relative to the horizontal) in which the car could remain in equilibrium? **(5 marks)**

(ii) If the street were icy and the coefficient of static friction between the car's tires and the road was μ_s = 0.2, what is the steepest slope in which the car could remain in equilibrium? **(5 marks)**

Figure 3

SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO (2) questions ONLY.
Please use the answer booklet provided.

Question 4 (20 marks)

A car of mass 400kg is moving with a velocity of 20 m/sec. A force of 200 N acts on it for 2 minutes. Find the velocity of the vehicle:

(a) When the force acts in the direction of motion. **(10 marks)**

(b) When the force acts in the opposite direction of the motion. **(10 marks)**

Question 5 (20 marks)

The total weight of the go-cart and driver is 1068 N. The location of their combined center of mass is shown in the **Figure 4**. The rear drive wheels together exert a 106.7 N horizontal force on the track. Neglect the horizontal forces exerted on the front wheels.

(a) Calculate the magnitude of the go-cart's acceleration. **(10 marks)**

(b) Calculate the normal forces exert on the tires at A and B. **(10 marks)**

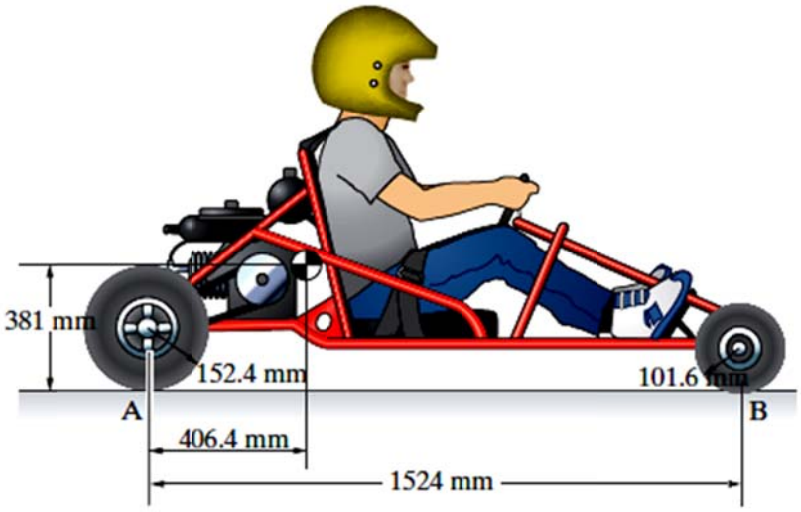

Figure 4

Question 6 (20 marks)

The 2000 N drag racer (**Figure 5**) starts from rest and travels a quarter-kilometer course. It completes the course in 4.524 seconds and crosses the finish line traveling at 325.77 km/hr. Assume that the force exerted on the car is constant.

(a) Calculate the maximum power

(b) Calculate the average power transferred to the car as it travels the quarter-kilometer course.

Figure 5

END OF QUESTIONS