



L-Università
ta' Malta

MATSEC
Examinations Board



Examiners' Report

IM Applied Mathematics

First Session 2019

Examiners' Report (2019): IM Applied Mathematics

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A. STATISTICAL INFORMATION

The total number of candidates who registered to sit for Applied Mathematics was **36**.

Table 1 shows the distribution of grades for the First 2019 session of the examination

GRADE	A	B	C	D	E	F	abs	TOTAL
NUMBER	2	4	5	8	4	7	6	36
% OF TOTAL	5.6	11.1	13.9	22.2	11.1	19.4	16.7	100

Table 1: Distribution of grades Applied Mathematics 2019 First Session

B. COMMENTS ON PAPER I AND PAPER II

Question 1

The majority of the candidates found this question hard to solve.

(a) A common mistake was that the cylinder was drawn such that the cylinder will slip down the plane. For the candidates who drew the cylinder in its correct position, the drawing of the forces was not correct by a number of candidates.

(b) For solving this part of the question, the examiner suggested using Lami's theorem or otherwise. Lami's theorem was well applied with the given angles, however common basic mathematical errors were that the angles of 120° and 150° which resulted were not reciprocated properly.

Question 2

The performance in this question was poor.

(a) Although most drew the original system of forces correctly, many had difficulty describing the resultant in terms of F_1 , F_2 and $4N$ forces. Very few used the slope and intercept of the line of action of the resultant, or took moments about the origin to form two simultaneous equations to solve for F_1 and F_2 . Hence the correct solution could not be found.

(b) Only a few candidates managed to show that its line of action is $3y = 2x$.

Question 3

(a) On the whole, the candidates answered the question correctly. However the most common mistake was finding the COG position of the cut out triangle BCE from the AB and AD axes. Few did not subtract for the removed section.

(b) Finding the inclination angle AB makes with the downward vertical was found to be straight forward and most candidates who arrived to part (b) answered it well.

Question 4

The majority of the candidates found this question difficult.

(a) Many candidates only gave answers for particle A. Errors involved: not labelling the datum and positive direction and hence neglecting the negative sign for \mathbf{V}_{Bx} (indicating in an opposite direction, ie towards A); not taking into consideration the vectorial position of \mathbf{r}_{Bx} starting at 60 m from A, ie $\mathbf{V}_{Ax} = -\mathbf{V}_{Bx}$, $\mathbf{V}_{Ay} = \mathbf{V}_{By}$ and $\mathbf{r}_{Ax} = 60 - \mathbf{r}_{Bx}$ and $\mathbf{r}_{Ay} = \mathbf{r}_{By}$; the final mistake was taking $a = g$.

(b) The time of collision occurs when $\mathbf{r}_A = \mathbf{r}_B$, equating gives the correct solution. Due to symmetry, the collision occurs at 30 m, hence the other method of solution is to find the time taken for particle A to reach $\mathbf{r}_{Ax} = 30$ m.

(c) Once the time for collision was evaluated in part (b), using this time of flight in \mathbf{r}_{Ay} , the height of collision was found. Mistakes were mainly algebraic.

Question 5

(a) It is expected that the graph sketch shows the question information, ie the time on the x-axis at positions A, B, C and D and that the distance travelled $AB = BC = 72$ m as the area under the graph. A distance-time line below would also ensure correct understanding of the problem to be solved.

(b) The question directs the candidate towards the methods of solution. The candidates only had to find the two equations. Many embarked on using the equations of motion to solve the question; the resulting algebraic equations proved too much to solve for many. Another common mistake was that for points on AB and BC, the candidate simply used $v = d/t$, where $d = 72$ m, $t_{AB} = 1$ s, $t_{BC} = 2$ s to find the V_A and V_B which is not the correct method of solution for this type of question.

(c) Many candidates did not use the easier method of the area under the graph, but preferred the more laborious algebraic method, making many mistakes in the process.

Question 6

Part (a) of this problem was attempted correctly by most candidates once the sketch for this part was properly drawn. The candidates who answered part (a) of the problem correctly also worked part (b) of the problem. Some candidates obtained the acceleration of the car of part (c) once the sketch for this part was also correctly drawn.

Question 7

Most of the candidates who attempted this problem lost the marks as they failed to draw the appropriate sketch for the situation discussed in the problem. This made it difficult to derive the appropriate equations. Part (c) of the problem was the least part of the problem that was answered correctly.

Question 8

This problem was attempted by nearly all candidates and the majority of the marks were awarded in this case as most of the results obtained were correct. The most common mistake in this problem was when a force in one of the rods was calculated while in reality there was no force acting in this rod.

Question 9

In this problem, it was important to draw a clear sketch showing the forces on the lamina at the point of slipping. It would then be easy to find the inclination of the straight edge. Most candidates failed to draw the proper sketch and this led to considerable loss of marks.

Question 10

This problem was poorly answered by the majority of the candidates who attempted it. Although the problem was standard, many candidates failed to draw a correct diagram, possibly due to the fact that the problem was not read properly before it was attempted. Parts (b) and (c) were then calculated incorrectly by most candidates. Part (b) involved a calculation of the angle between the string and the vertical, but the angle used by most candidates in their calculation was not this angle. Only few candidates were awarded full marks for their attempt of this problem.

Chairperson
Examiners Panel 2019