



Subject: System Dynamics and Vibration **Subject Code:** EMM304
Examiner: Dr. Ayman Nada
Time Allowed: Open Time **Date:** 3/5/2020
Final Received Date: 7-6-2020

Sources allowed:

1. Textbooks.
2. Egyptian Knowledge Bank.
3. Internet.

General Notes:

- The report must be divided into title and subtitle.
- The report must contain (introduction – explain of subtitle – conclusions – list of references).
- Each sub-title must contain at least **two** solved examples.
- Use graphs to support your position.
- The report must be formatted in the same way for all report Pages. (Format will be considered in evaluation).
- Use justify mode in writing.
- Report must be about (8-10 papers excluding the cover).
- You should refer to each reference and make a list of references at the end of the report.

المصادر المسموح بها:

- الكتب.
- بنك المعرفة المصري.
- الانترنت.

ملاحظات عامة:

- يجب تقسيم التقرير إلى عنوان وعنوان فرعي.
- يجب أن يحتوي التقرير على (مقدمة - شرح العنوان الفرعي - الاستنتاجات - قائمة المراجع).
- يجب أن يحتوي كل عنوان فرعي على مثالين تم حلها على الأقل.
- استخدم الرسم لتوضيح وجهة نظرك.
- يجب تنسيق التقرير بنفس الطريقة لكافة صفحات التقرير. (سيتم اخذ التنسيق في الاعتبار عند التقييم).
- استخدام وضع justify في الكتابة.
- يجب أن يكون التقرير في حدود 10 (أوراق باستثناء الغلاف) PDF format.
- يجب الإشارة الى كل مرجع و عمل قائمة مراجع بنهاية التقرير.

Report Title:

Comparative study of "numerical" and "Laplace transform" methods of solving the differential equations of dynamic systems: Case study of mass-spring-damper system

Subtitles:

1. What are the dynamic, modeling and solution means?
2. Dynamic model of mass-spring-damper system, (give some examples)
3. Solution of the differential equation using Laplace transform for damped/undamped cases.
4. Solution of the differential equation for free (initial conditions) and forced conditions using Laplace transform.
5. Solution of the differential equation using the Euler method for damped/undamped cases.
6. Solution of the differential equation for free (initial conditions) and forced conditions using Euler method.
7. Comparison between results of point (3,4) and (5,6)?

Report Title:

Investigation of the equivalent lumped models for the physical applications of mechanical elements

Subtitles:

1. Describe the equivalent masses and moments of inertia of rigid bodies
2. Describe the equivalent masses and moments of inertia of elastic bodies
3. Describe the equivalent stiffness of mechanical springs, rods, rubber and pendulum.
4. Describe the equivalent stiffness of beams (linear / torsional).
5. Describe the equivalent damping of air spring piston and dashpot.
6. Describe the equivalent damping of mechanical dampers.
7. Present some practical application of mechanical systems.